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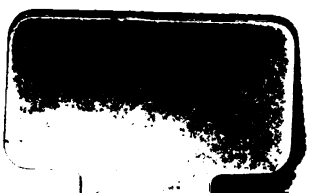

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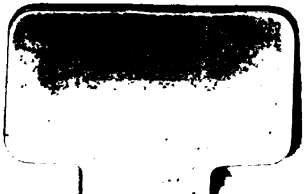

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THE

REGISTER OF ARTS,

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JOURNAL OF PATENT INVENTIONS.

PATENTS ENROLLED BETWEEN 10TH FEBRUARY, AND 10TH MARCH, 1831.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

GAS.—To J. Down, of Leicester, a patent for "certain improvements in making gas for illumination, and in the apparatus for the same," was granted on the 5th of August, 1830, and the specification was enrolled in the Rolls Chapel Office, on the 5th of February, 1831.

Our readers are aware that in the distillation of coal for obtaining illuminative gas there results also a large quantity of tar and ammoniacal liquor, and the gaseous product is itself so crude as to require a subsequent process of purification, which is usually effected by passing it through a solution of lime in water. Mr. Down's patent is for a method of superseding the use of the latter operation; by which process, it is stated in the specification, a much larger product of illuminative gas is obtained. His method consists in conducting the products of the first distillation (made in the common way) immediately into another retort containing a series of strata (or an extensive stratum) of coak or charcoal in a state of ignition, through which they are made to percolate; by these means the gas is rectified, and the tar and ammonia are

decomposed, thereby yielding a considerable additional quantity of gas.

The illustrative drawings annexed to the specification exhibit two of the ordinary cylindrical retorts set horizontally in a furnace, with tubes proceeding from them to a third retort fixed above them, in which the purification of the nascent gas and the decomposition of the liquid products of the first operation, takes place.

This latter vessel we have delineated in section at fig. 2, Pl. I. where *a* shews the aperture through which the gas, &c. enters from beneath into the mouth piece *b*, whence it passes through the ignited coke or charcoal contained in the several compartments of the body of the retort, formed by the partitions *c d e f g h i j k l m n*, by going over *c*, under *d*, over *e*, under *f*, and so on, till it escapes at *o*, which leads to the gasholder. This retort is rectangular in its transverse section; of the usual length, and the breadth about half that of the depth: the compartments are shewn in our drawing as open, but they are closed during the operation by the usual contrivances for that purpose.

TABLE LAMP.—To S. Parlour, of Croydon, Surrey, a patent for "improvements in Lamps, which he denominates 'Parlour's improved Table Lamps'," was granted on the 13th of December, 1830, and the specification was enrolled in the Enrolment Office on the 12th of February, 1831.

As the specific gravity of water is to that of lamp oil as 10 is to 9, a column of water of two feet will balance a column of oil two feet, two and a half inches height: and of this fact Mr. Parlour has availed himself in the construction of a lamp, by which the oil is raised from a reservoir in the base of the pillar to the burner by means of the pressure of a column of water, in a manner which will be readily understood by inspecting fig. 3, Pl. 1., where *a a* represents a bell glass vessel cemented to the top of the pillar and to a tube *b b*, which contains the burner and the apparatus connected therewith, precisely of the usual arc and construction. This vessel, which is ground outside to diffuse the light more agreeably, contains water to counterbalance the oil and raise it up to the burner; and as both the water and the containing vessel are transparent the light will not be intercepted, and consequently will be no shadow projected. A pipe *x x*, shown by dotted lines, descends from the water vessel *a a*, to very nearly the bottom of the oil reservoir *c c c c*, by which the water descends and forces the oil to ascend up another pipe which proceeds from the top of the

oil reservoir to the burner *y y*; so that the oil will continue to rise to the burner until it is entirely displaced by the water: when the water is to be drawn off by a stop cock represented at *d*.

When this lamp is to be trimmed the burner must be unscrewed and a funnel screwed in its place, through which oil is to be poured till the reservoir is full, then the burner is to be replaced and clean water supplied to the water vessel till it ascends very nearly to the top of the burner; care being taken not to make it overflow, otherwise the waste oil-cup *e* will soon be filled and the oil will run over.

CANDLES.—To William Palmer, of Wilson Street, Finsbury Square, a patent "for improvements in making candles," was granted on the 10th of August, 1830, and the specification was enrolled in the Enrolment Office on the 10th of February, 1831.

Mr. Palmer proposes to make candles which will burn without requiring snuffing by the following method. He applies to a portion of the strands, about a tenth of them, composing the wick, a quantity of *bismuth*, in a finely divided metallic state, or else the nitrate, or any other similar preparation of bismuth. The portion of wick thus prepared is to be surrounded with more strands, till it becomes half the thickness required for the wick. It is then to be cut into pieces corresponding in length with twice that of the candle for which it is intended.

The wick is next twisted spirally round a thick steel wire, in contrary directions, as represented by fig. 6, Plate I. A notch is made in the lower end of the wire at *a*, to receive the middle of the wick, and the upper end is bent into a rectangular loop *b*, to retain the two ends *c c* of the wick together, and to facilitate its removal when the making of the candle is completed, which is to be effected either by moulding or dipping, in the usual manner.

The combustion of the wicks of candles manufactured in this manner, with a portion of bismuth in combination with the wick made of the double spiral form, that the two pieces may in the act of burning curl over to different sides, as represented by fig. 7, Plate I., where they will be accessible to an additional quantity of oxygen, and the combustion will be so intense as to leave no carbonaceous matter to impede the light, or to require removal by snuffing.

The patentee confines his claim to the application of bismuth, either in a metallic state finely divided, or else the nitrate or other preparation of bismuth and the spirally formed wick.

SADDLE GIRTHS.—To J. Lawrence, of Birmingham, and W. Rudder, of Edge, Gloucestershire, a patent for "an improvement in saddles and girths, by an apparatus affixed to either of them," was granted on the 10th of August, 1830, and the specification was enrolled in the Rolls Chapel Office on the 10th of February, 1831.

The intention of these patentees is, to give to saddle girths an elasticity, to preserve sufficient tension under the varying dimensions of the animals to which they may be applied. Saddle girths put on for instance immediately after the horse has been fed, must either be made inconveniently tight at first, or else they will become inconveniently loose as the size of the animal diminishes by the digestion of his food. The proposed plan of constructing the elastic girths, which are denominated by the patentees *constrictor girths*, (we presume from their grasping the animal like a boa constrictor), is, to attach to the saddle-tree, by a pair of small hinges, a small brass box *a a*, containing a series of steel springs, of any convenient form, the preference being given to the grasshopper kind, as shown by fig. 5, Plate I, with the front plate removed to show the arrangement of the interior. Behind the springs is a moveable plate, to which the girth straps *b b* are attached: and this moveable plate has a flange at its upper edge to project over the highest spring, while the lowest spring rests on the bottom of the box. Thus when the moveable plate is pulled down by the girth straps, the springs are collapsed or brought into a position to exert their elasticity in preserving the tightness of the girth. The patentees do not however confine their claim to the grasshopper springs, though they give that form the preference; but describe two other forms, one of which consists of a series of L shaped springs, attached to the lower left hand corner of the box and extending horizontally along the top, the lower springs being made shorter than the upper, similar to the plan adopted by coach spring makers: and the other of a series of springs bent in the form of the letter C; the exterior of these springs, as in the last case, is the longest, and the interior the shortest, with a successive diminution of the intermediate ones.

In both these arrangements it is necessary to introduce a lever turning on a pivot fixed in the box, with a strong connecting link at each end, the one joining it to the middle of the moveable plate, and the other to the moveable end of the upper spring.

COCKS FOR DRAWING OFF LIQUOR.—To. J. Dixon, of Wolverhampton, and J. Vardy, of the same place, a patent for "improvements in cocks for drawing off liquids," was granted on the 13th of December, 1830, and the specification was enrolled in the Enrolment Office on the 12th of February, 1831.

These patentees have designed a cock which is to be closed by screwing a conical plug down upon a conical bed, as represented by *a a*. A stem *b* proceeding from the plug screws into a cavity at *c*, with a double or triple thread of such rapid inclination, that it will be sufficiently raised to admit room for the free passage of the liquid, by turning it a quarter of a revolution by the handle *d*. The stem of the plug is likewise continued downwards to *e*, where it is furnished with a cross arm passing through it and fitting into longitudinal slits *f f*, in the interior of the delivery pipe. By means of these it is to be turned to screw it up or down; but to accomplish this it is necessary that the delivery pipe should be made to turn, which it is by securing it within the piece constituting the plug seat, by means of a flange working between collars of leather, and secured in its place by a screwed ring below it, as shown at *g g*.

In manufacturing this cock it will be necessary to make the plug seat to screw into the body of the cock, in order to get the plug introduced, or else to introduce it from the upper side and afterwards screw on the top piece *c*. Stop cocks manufactured in this way may be convenient and answer the purpose very well; but we fear, that the number of pieces, and consequently, the quantity of fitting which the different parts require, are too great for its very general adoption.

GUN LOCKS.—To B. Redfern, of Birmingham, Warwickshire, a patent for "a lock-break-off and trigger upon a new and improved principle, for fowling pieces, muskets, &c." was granted on the 17th of December, 1830, and the specification was enrolled in the Enrolment Office on the 14th of February, 1831.

The object of this invention is to guard more effectually against accidental discharges of fowling-pieces and other small fire-arms, and at the same time to facilitate the discharge when required. To accomplish this it is proposed, to cause the discharge by the pressure of the thumb upon a small bolt or punch, which proceeds from the catch that retains the hammer in its position, when the actuating spring is brought into full tension

to the upper part of the stock where the thumb rests in the act of firing; so that by pressing down this bolt the spring is released to act upon the hammer. The other parts of the lock are but slightly altered, though the trigger has a different office to perform from that usually assigned to it; for it has to remove a guard cap which covers and protects the firing bolt. This guard cap is made to move backwards and forwards on the upper part of the stock handle, and it is kept in its place by a small spiral spring, except when it is pushed forward by the upper end of the trigger, prolonged beyond the fulcrum for that purpose.

From this arrangement, it will be perceived that when the piece is to be discharged, the finger must be first applied to the trigger to remove the guard, and the thumb to the firing bolt to release the hammer.

AXLETREES.—To W. Mason, of Margeret Street, Cavendish Square, Axletree Manufacturer, a patent for "improvements in axletrees and their boxes," was granted on the 24th of August, 1830, and the specification was enrolled in the Enrolment Office on the 24th of February, 1831.

To few men are we more indebted for the ease, safety, and speed with which coach travelling is accomplished than to Mr. Mason for his successive, and always successful improvements on axletrees and their boxes. He seems to have a peculiar facility in finding out and applying remedies for the minute defects connected with his department of the coach manufacture.

We have in vol. iv. page 263 of the first series of the *Register of Arts*, described a very ingenious plan of his for entirely preventing end play of the box, and for rendering it impossible for the wheel to come off. These improvements were applied principally to what is generally denominated patent axletrees, and the present apply more especially to the kind denominated mail axles, although some parts of the invention will apply to either kind. A portion of an axle and its box with the improvements distinguished, are shown by fig. 1, Pl. I., where *a* represents the box-cap, which constitutes at the same time an oil-cup *c* with a conical end *b*, which fits into the conical part *g* of the axle *f*, when that is fitted into the box *e*, and the cup *c* screwed into *d*. The oil then passes through an aperture in the end of the cup *b*, into the hollow part of the axle, and passes out to the box at an aperture *h*, and supplies the long reservoirs in the interior of the box. There is likewise a very small groove cut longitudinally on the

axle, extending both ways from *h*; so that the oil may be readily distributed over all the bearing parts. This lubricating arrangement is evidently applicable to both kinds of axles; but the other part of the contrivance, which has for its object the better security of the wheel and the prevention of end play, so as to allow the escape of oil from the box, or the admission of dust or other impurities into it, applies exclusively to the mail axles, or those which are kept in the box by means of screws at its inner end. This consists in casting three wrought iron screws into three lugs on the box, two of which are shown at *n n*. When the axle is introduced into the box the conical part *i* fits the conical part *j*, and tends to preserve the leather collar between *i* and *k*, while the loose plate *m m* fits upon and is firmly secured by the screws *n n* to the end of the box; and thus the box is kept in its place by the flange *k*, which works in the recess *l*, and the wheel is prevented from coming off by the plate *m m*. Formerly this plate was fastened either by short screw bolts passing through it and the lugs of the box; a method which has been found defective on account of their liability to shake loose by the constant jarring of the coach. To remedy this, and to facilitate the removal of the wheel when desirable to take it off, the back plate was fastened by long bolts passing through the nave and screwed on the outside; but this too was found defective on account of the danger caused to the nave by the bolt holes, and their occasional removal when the wheel required taking off, and to remedy these is the object of the invention we have been describing.

PAPER SIZING.—To M. Towgood, of Dartford, Kent, and L. Smith, of Paternoster Row, London, a patent for "an improved mode of applying size to paper," was granted on the 18th of August, 1830, and the specification was enrolled in the Enrolment Office on the 18th of February, 1831.

In order to insinuate the size more effectually into the paper, it is proposed by the invention before us to apply pressure at the same time with the size, and this is effected by depositing on the surfaces of a pair of pressure rollers, or one of them if the paper be required to be sized only on one side, a thin uniform film of size, which is pressed into the paper as it passes between the pressure rollers. An endless felt is sometimes made to pass over each of the rollers, and in that case the size will be forced through the felt to the paper. This sizing apparatus may be applied either separately or in combination with a paper machine of any con-

struction; but the form and arrangement of the different applications will necessarily vary with the form of the machinery to which it may be applied. One form of the apparatus and the method of supplying the size is shown at fig. 1, Plate II., where *a b* represent two pressure rollers, with pieces of endless felts *c c c*, and *d d d* passing round them, being supported and guided by a series of friction rollers *e e e* and *f f f*; *g* is a small trough with a perforated bottom for supplying the size on the surface of the pressure roller *a*; and *h* is a similar trough for supplying size to the roller *i*, which transfers its supply to the other pressure roller *b*; and *j j* are two scrapers for keeping clean the surfaces of the pressure rollers.

Woollen Cloth Shearing and Dressing.—To G. Oldland, of Hillsley, Gloucestershire, a patent for "certain improvements in the machinery or apparatus for shearing and dressing woollen cloths, and other fabrics," was granted on the 22nd of July, 1830, and the specification was enrolled in the Rolls Chapel Office on the 22nd of January, 1831.

In the process of shearing Mr. Oldland proposes to employ small rotatory cutters, turning horizontally with great rapidity, having their sharp edges to lap over a straight ledger edge, along which they are made to traverse a short distance, so as to shear by a kind of clipping operation, the surface of the cloth, which is brought under the cutters by an arrangement of apparatus similar to that usually adopted for bringing the cloth under the operation of shearing machines.

One of the rotatory cutters is represented by fig. 8, Plate I.; it is made cup shaped on the under side, that the contact of the cutting edge with the ledger edge may be the more certain, and it is strengthened by a thick circular piece being fixed on its upper side. To this circular piece is attached a stem or axis, which proceeds up to a horizontal frame where it receives motion by the application of a band to a small pulley fixed at the top of the spindle. A series of these cutters are arranged on the horizontal frame, extending the width of the piece of cloth under their operation.

Mr. Oldland's improvements in dressing woollen cloth and other fabrics, consists in a horizontal revolving teazle-frame, furnished on its under side with teazles, wire-cards, brushes, or other material used in dressing or raising the pile of the cloth. The revolving teazles are to be put in motion in a manner precisely

similar to that adopted for giving motion to the rotatory cutters before alluded to: and as the cloth is brought under the teazles by conducting rollers of the usual construction it is pressed up against the teazles by a supporter, covered with some elastic material, only on that side of the centre of motion of the revolving teazle which moves from the middle towards the selvage of the cloth, the teazle frame only reaching half way across it, and one being placed on each side moving in different directions, the pile will be raised in all cases from the centre towards both selvages of the piece of cloth, though from the nature of the action of this machine it is evident that its operation on the cloth can in no case be rectilineal, and that by the end motion of the cloth the lines of action will be continually crossing each other at very acute angles.

POWER ENGINE.—To J. Ericsson, of the New Road, St. Pancras, Middlesex, a patent for "an improved engine for communicating power for mechanical purposes," was granted on the 22nd of July, 1830, and the specification was enrolled in the Petty Bag Office on the 22nd of January, 1831.

The specification of this invention we have read with great attention, but without being able to discover what the patentee really means; and if we guess him aright, it does not appear to us that his engine will move at all, much less at that extraordinary velocity which would render the application of cogged wheels inadmissable, as is mentioned in the specification. In this document the invention is stated to consist in producing a rotary motion, by causing steam to pass through a series of inclined channels made in a hollow drum, which channels "*oppose a resistance*" to the passage of the steam and cause the hollow drum to revolve, the axis of which is to communicate motion to any other machinery that may be attached thereto.

Very good drawings to scale accompany the specification, which represent an engine said to be of 50 horses power, but no data is given by which such calculation is made, nor indeed is any intelligible explanation afforded how *any* power is rendered available. According to the scale of feet attached to the drawing, the revolving drum is about 2 feet 6 inches in diameter, about 3 inches wide at the middle, and tapering off from this width to nothing at the periphery. At fig. 2, Plate II. is given a section of the machine, where *a* represents an axis, supposed to revolve in suitable bearings and frame not represented; to this axis is

fixed the hollow revolving drum *b b*, (called by the patentee the "fly-drum, on account of its peculiarly rapid and uniform motion") being connected thereto by a boss *c c*. Accurately fitting the cavity of this drum are three radiating stationary vanes *d* and *e*, the latter being seen in the perspective shews the interior of the fly-drum in front; the vanes are affixed to a collar *f f* which is loose upon the axis *a*, but screwed fast to the side of the steam passage *g g*, thus allowing the axis and the fly-drum to revolve while the vanes remain fixed. On the surface of the fly-drum are made three curved channels *h h*, inclining and opening into the interior, and in order that these projecting parts may not obstruct the revolution of the fly-drum, suitable pieces are cut out of the vanes to allow them to pass clear. *i i* is a steam-chamber, forming an external case to the principal parts of the engine; *j* the steam supply pipe, and *k* the exit steam pipe: the separate figure *m* shows the form of one of these channels.

The operation of the engine is thus described. Steam being admitted into the external case *i*, it forces its way through the inclined channels *h h* of the fly-drum, and by its action upon them "draws round" the fly-drum, the steam being then prevented by the fixed vanes in the interior from following the course of the fly-drum finds its way out at the apertures *l l* into the passages *g* and *k*.

The patentee attaches great importance to the proportions of the inclined channels in the fly-drum; it being absolutely necessary, he says, that the length of the channels shall always exceed the depth, in order that the channels may move with greater velocity than the steam acting against them; and he observes, that when the length is to the depth as 2 to 1, the channel will move at twice the speed of the steam acting upon them: and this velocity appears by the specification to be so great, that the patentee has thought it necessary to provide substitutes for cog-wheels applied directly to the axis. These substitutes are slightly indented friction rollers, upon which the axis is to be pressed down by weighted levers.

As it is improbable to suppose that an engineer having the facilities of Mr. Ericsson for experimental investigation should have patented this engine without proving its efficacy, we are strongly inclined to think that he must have intrusted the drawing up of his specification to some incompetent person.

WOOLLEN CLOTH DRESSING.—To Daniel Papps, of Stanley End, in the parish of King Stanley, in the county of Gloucester, Machine-maker, a patent for "certain improvements in machinery for dressing or roughing woollen cloths," was granted on the 23rd of December, 1830, and the specification was enrolled in the Enrolment Office on the 23rd of February, 1831.

It is desirable in the process of roughing or raising the pile of woollen cloth, that the action of the teazles should be made to deviate from straight lines on the surface of the cloth; and with a view to produce a motion combining this advantage, Mr Papps proposes, as Mr. Oldland had previously done, to make the teazles to rotate in contact with the surface of the cloth. To the lower end of a vertical rotatory spindle, are fixed two horizontal cross arms, and on the ends of these are fixed small teazle frames, of a rectangular form; which being furnished with teazles fastened in by a slight spring and a cord, are made, by the vertical spindle, to revolve in contact with the surface of the cloth. These teazles, like the last mentioned, are made to act only from the middle towards the selvages of the cloth, and through means which are very similar. Indeed, although the form of Mr. Papp's apparatus is somewhat different from that described by Mr. Oldland, the principle and the operation are the same in both cases.

STEAM CARRIAGES.—To William Heaton, George Heaton, and Reuben Heaton, of Birmingham, Manufacturers and Copartners, a patent for "certain machinery and the application thereof to steam engines, for the purpose of propelling and drawing carriages on turnpike roads, and other roads and railways," was granted on the 5th of October, 1830, and the specification was enrolled in the Petty Bag Office on the 5th of February, 1831.

The complicated nature of the machinery exhibited in the specification of this patent, renders it quite impossible to make it fully understood without an extensive drawing and a detailed description: and as it is quite impossible for us to find room for either in the present number, we shall confine ourselves to an outline of the methods which the patentees adopt to accomplish the object they have in view; that of guidance of a locomotive carriage and the management of the steam apparatus, that the power and speed may be readily accommodated to the nature of the road, the quantity of the load, &c.

For the purpose of guiding and steering the carriage, a ver-

tical spindle is placed at some distance before the axle of the front wheels, and on its lower end a small drum is fixed. Around this drum is coiled a chain with its middle fixed upon the drum, and its ends made secure to the front axle at a considerable distance from the middle, so that the chain and axle may form a triangle with the drum, situated at the angle opposite the longest side. The other end of the vertical spindle is connected with a frame situated in front of the coachman's or rather the steersman's seat; and here is fixed upon the spindle a horizontal bevilled-toothed wheel. Over this wheel an axis extends terminated in two crank handles proceeding from the axes in different directions, so that one will be down when the other is up; and upon this axis is fixed another bevilled-toothed wheel taking into the first. Now it is evident when these wheels are turned in one direction the right-hand fore wheel of the carriage will be advanced, and the coach will be turned towards the left, while if they be turned in the other direction, the left-hand wheel will be advanced and the carriage will be turned towards the right. This plan of steering will be immediately recognized by the readers of the *Register of Arts*, as the same as the steering plan adopted by Messrs. Anderson & James.

The driving wheel, or those to which the power of the engines is to be applied, are connected with the axle by means of a pair of ratchets furnished with a double set of ratchet teeth and a reversing pall. By this contrivance, one wheel can be advanced or backed while the other is stationary, or moving in a contrary direction: an arrangement which becomes necessary in the act of turning and backing. The means of acting upon the reversing pall is brought within the reach of the steersman by means of a set of connecting rods and lever.

Motion is communicated to the driving wheels by a double set of spur wheel gear, arranged to give different powers or velocities, by having both a large and a small wheel fixed on the driving as well as the driven axis. By bringing the large wheel on the driving axis into gear with the small wheel or the driven axis, speed is obtained; and by shifting their relative position till the small wheel on the driving axis comes into gear with the large wheel on the driven axis, power is obtained at the expense of speed. These two axes are kept at the same distance from each other by means of connecting rods, notwithstanding the relative position may be changed by the motion of the carriage on rough roads.

These patentees do not claim novelty in any one of their ar-

rangements in a detached form, but only the combination of the whole, as they have described them in their specification. A principal merit of the arrangement seems to be, that all the adjustments are brought within reach of man having the guidance of the carriage.

RICE.—To C. Shiels, of Liverpool, a patent "for certain improvements in the process of preparing and cleansing rice; which was communicated by a foreigner residing abroad," was granted on the 5th of August, 1830, and the specification was enrolled in the Petty Bag Office on the 4th of March, 1831.

Our readers are aware that the rice we have at our tables is originally surrounded with two distinct coats; in which state it is termed *paddy*: the external one is hard and shell-like, and the interior soft and delicate. The common method of depriving them of the first mentioned coat is by triturating them gently between two flat mill-stones, which are set at a certain distance apart with the view of preventing the grain from being broken: nevertheless a considerable portion of the rice does get thus broken, and is in consequence reduced to comparatively little value. The separation of the inner skin (which is of a reddish colour) is of greater difficulty to perform well, and it is usually effected by a tedious process of triturating in a series of mortars.

[In former articles on the subject we have described various means of cleaning paddy; they are scattered throughout the work; but several machines for the purpose will be found delineated and described in our first volume of the present series.]

In the specification now before us, the patentee proposes to use for the first operation of shelling, instead of two mill-*stones*, one mill-*stone*, and one mill-*wood* (of a similar figure to the stone), and the paddy is to be milled thereby in the usual way. The second operation of taking off the thin pellicle, Mr. Shiel performs by rubbing the grain between the flat surfaces of two wooden runners, which are covered with sheep-skin with the wool on: and the wool is placed next to the surfaces of the runners, between which the rice in contact with the flesh sides of the skin, receives an elastic pressure, owing to the springiness of the wool underneath, and thus the effect is a very close approximation to the old-fashioned method of clearing grain by rubbing it between the hands. The grain or paddy being nearly all starch, it swells much by heat, which bursts the pellicle, and allows it to be easily removed; and we can conceive nothing better calculated to produce this effect

than the rubbing process described; an effect not noticed in the specification, and perhaps never thought of by the patentee.

We may here observe, that Messrs. Lucas and Ewbank had a patent in 1819, in which sheep-skins with the wool on were claimed; but the manner of using the skins, and the purposes to which they were applied, were essentially different. Messrs. Lucas and Ewbank employed the wool *outwards* to scour and polish the grain. (See Register, vol. i. N. S. page 84.) We think Mr. Shiel's application of them to be a decided improvement.

We have not noticed the sifting, winnowing, &c. mentioned in Mr. Shiel's specification, as there is confessedly nothing new in them, and they have been duly noticed in previous articles.

FIDS.—To Henry George Pearse, of Liverpool, Master Mariner, Richard Gardner, and Joseph Gardner, of the same place, Merchants, a patent for "an improved fid," was granted on the 7th of September, 1830, and the specification was enrolled in the Enrolment Office on the 3rd of March, 1831.

It would appear, from the number of the patented inventions for carrying home the top mast of a ship quite to its place and preserving it there till required to be taken down, that this is one of the most difficult operations in the management of a ship. The plan before us is neither deficient in simplicity nor security; but it does not seem so susceptible of expeditious application as some others which will be found in the previous volumes of the Register. It merely consists of a metallic bar passing through a mortice in the upper mast, with a strong capstan-headed vertical screw at even end, whose spherical ends are made to rest in a metallic cup in the two opposite trestle trees. When the top-mast is elevated as high as the tackle will raise it, the iron fid, with its end screws very nearly withdrawn, is passed through the mortice in the lower end of the top-mast, and the screws with their ends resting in the metallic cups, are there to be screwed through till the mast is raised: and upon these it rests till they are unscrewed and the fid withdrawn to allow the mast to be again lowered.

WHEELS FOR RAILWAY CARRIAGES.—To W. Losh, of Benton House, Northumberland, a patent for "improvements in wheels for railway carriages," was granted on the 31st of August, 1830, and the specification was enrolled in the Enrolment Office on the 28th of February, 1831.

The nature of this invention will be at once understood from inspection of the figures 3 and 4, Plate II. where *a a a a* represents the tire of a wrought iron wheel; *b b b b* spokes which are to be made dove-tailed at one end and cast into the nave *e*, as shown in section at *c c*, fig. 4. The other end of the spoke has a right angular crank bend, as shown at *f f f f*, fig. 3; being carried round the circle to the next spoke; and thus each spoke and its adjoining felloe are made of one piece of iron. By means of the crank bend at the end of the spokes one felloe is permitted to pass over the end of another, and at this double part they are securely fixed together by strong screws, as shown by dotted lines. The tire, which is formed in passing finally through the rollers at the iron works, with a recess for the felloe and a ledge to keep the carriage on the rail road, as represented at *a a*, fig. 4; and it is to be heated and fitted on the wheel in the usual manner, that it may contract and firmly grasp the wheel when it contracts in cooling. The ends of the spokes too must be made hot before the nave is cast upon them, that the junction of the two metals may be the more perfect. It is stated that it may be sometimes found more convenient to weld several pieces of iron together than to bend one piece twice at right angles. It is likewise stated that the spoke may be sometimes with advantage welded on the middle of a piece extending along a ring constituting the felloes in both directions.

Another plan of making these iron wheels is represented by fig. 5, where *a b c* designates a piece of wrought iron bent into a portion of a circle in the middle, and its two ends into the position to constitute two half spokes: which being provided with a nave, as above, and firmly fixed together by screwing or otherwise, constitute a wheel ready for the tire, to be put on hot, as in the preceding cases.

CHIMNEYS.—To James Chadley, of Gloucester Street, Queen Square, Surveyor, a patent for "certain improvements in making or forming bricks, tiles, and chimney bars, applicable to the building or erecting the flues of chimneys," was granted on the 13th of September, 1830, and the specification was lodged in the Enrolment Office on the 28th of February, 1831.

There are three methods described by this patentee of carrying his invention into operation. He first proposes to make with one of their sides or ends made concave, for the formation of circular or elliptical-shaped flues, and for turnings in the flue he employs

bricks with the upper edges of the concave sides or ends bevilled off to correspond with the intended deviation from the straight line.

He, secondly, proposes to make tiles with rebates at their edges, that they may accurately fit each other, and with these he proposes to form a lining for chimney flues. These lining tiles must necessarily be made of different dimensions to correspond with the different sized chimneys.

And in the third place he proposes to employ a cast-iron chimney-bar sloping upwards from the front at an acute angle as represented by the sectional diagram fig. 7, Pl. II. The advantages aimed at by this arrangement is evidently to cause the chimney breast to slope upwards as it recedes backwards, instead of having a horizontal base, according to the practice actually adopted in the construction of chimneys.

PRINTING.—To A. Applegarth, of Crayford, Kent, Printer, a patent for "improvements in printing machines," was granted on the 31st of August, 1830, and the specification was enrolled in the Enrolment Office on the 28th of February, 1831.

Mr. Applegarth, who in conjunction with Mr. Cowper, has already introduced extensive improvements into the machines for letter-press printing, has recently given his attention to their introduction on a principle somewhat similar to the printing of calicoes and other fabrics, or materials intended to receive impressions from engraved metallic plates.

The plates on which the intended pattern is engraved are to be bent, to coincide with a portion of the circumference of a roller, on which they are secured by means of screws. At each extremity of the plate, suppose it is bent lengthwise about the roller, is a longitudinal cavity, and in these are fixed projecting ears to receive the screws, by which the plates are to be drawn tight to the surface of the roller. In order to connect the screws with the plates, their ends are slit up a short distance, and some portions of each end of the plate are turned back to form hooks. The roller thus mounted with a plate brings at each revolution the plate in contact with an inking or rather colouring apparatus of the description usually employed for inking or colouring printing rollers, it then brings it in contact with the fabric to be printed, which receives the impression in its passage through between the plate and a pressure roller placed below it. The motion of the drawing roller, which conducts the goods to be printed through

between the plate roller and the pressure roller, has its motion connected with that of the others, to secure the correct repetition of the pattern at each revolution. When the plate does not extend all the width of the plate roller it is shifted the length of itself on the roller, in order to repeat the pattern on a second portion of the width, and so on for a third or fourth if necessary. And this shift is effected by making the end of the plate rest against a guide plate, with steps of breadths with the length of the pattern plate, and the number of times it is required to be repeated, and the width of the calico. The pattern plate is kept up to the guide plate by a heavy weight, suspended to it by a cord passing a pulley at a convenient distance.

SHIPS' TACKLE.—To J. Revere, of Weybridge, Surrey, a patent for "an improved method of protecting iron chain cables, iron boilers, and iron tanks, from the corrosion produced upon them by the action of water," was granted on the 27th of November, 1830, and the specification was enrolled in the Petty Bag Office on the 26th of January, 1831.

Since the discovery of Sir Humphrey Davy that copper sheathing on the bottom of ships might be preserved from corrosion by the application of zinc plates, several others have found out, as might have been expected, that zinc might be advantageously applied to other metallic parts of a vessel exposed to the action of salt water; and amongst them Mr. Revere, after "much study and expense,*" discovered that a plate of zinc fixed by riveting, screwing, or otherwise, to the links of chain cables, would tend to preserve them against rapid corrosion. This he proposes to effect by fixing a small plate of zinc in a recess made in the central stud of each link of the chain, as shown at fig. 6, Pl. II., where *a* shews the plate of zinc made in the recess of the stud, being secured there either by bringing over the edges which surround the plate, or by riveting, &c. The area of this plate need not be more than 5 per cent. of the whole surface of the link; less will do, as even 3 per cent.; but the first mentioned proportion, he observes, protects the metal with more energy and efficiency. In the same manner the patentee proposes to protect the ship's tanks and boilers, by fixing small plates in the inside at uniform distances apart, so as to cover about 5 per cent. of the surface.

* Words used by every applicant for a patent.

The patentee fortunately does not extend his claim to other objects of a ship's tackle, accordingly the public are left at liberty to do what they please with their anchors, pumps, and other appurtenances of a ship.

CALVERT'S PATENT SADDLES.

In our number for February last, page 257, we gave a description, and at Pl. XVII. fig. 1, a sketch, from memory, of this invention. We have however been informed by Mr. Calvert that our delineation is incorrect, and does not shew the merits of his invention; and we have in consequence given a fresh drawing of the subject in this number (see fig. 4, Pl. I.) which is a fac-simile, on a reduced scale, of one sent to us by the patentee. In the essential part of the invention, (the saddle-*stay*, all that we regarded) we are not sufficiently acquainted with the mysteries of the saddler's art, to discover any error worthy of notice in our first drawing; but we willingly *bow* to the correction of the intelligent inventor. The descriptive matter which accompanies the figure we have now delineated, is as follows:—

Fig. 4, Pl. I. " is the naked tree, placed upon the pannel, with the improvement confined by two loops, which receive the girth-strap; the proper shape of the sweat-flap is also shewn. The small buckle which is affixed to the loose end of the girth, is drawn up to the small strap after the horse is girthed. The point girth of course is strapped first, and the second not quite so tight."

Editor of " Mechanics' Magazine" and the descriptive List of Patents in the Register of Arts.

TO THE EDITOR.

Sir,—As you are perhaps not aware that the Editor of the Mechanics' Magazine has commenced publishing an abridgement of articles or new patents, entirely extracted from the Register of Arts, I take the liberty of calling your attention to this piracy, and requesting you will take the means of putting a stop to it by a public exposure, for I too am a sufferer as well as yourself by the practice. Had the descriptions been given as they appeared in the Register, with or without acknowledgement, I should willingly have left the matter for adjustment between him and yourself; but he has, to conceal the source of his information, so mangled your already too condensed description, that the interests of the patentees, and my own amongst the rest, are likely to suffer

severely by his disingenuity, For he evidently misrepresents that he may condemn; probably with a view to draw ingenious individuals into a correspondence with his work. But this trick will not do, at least with myself; for I should feel extremely sorry to enter the lists with a host of the perpetual motion correspondents men who are evidently entirely ignorant of the very first principles of mechanics.

I remain, Sir,

Birmingham, 7th March, 1831. Your constant reader,

A PATENTEE.

We have to thank the writer of the foregoing letter for drawing our attention to the wholesale piracy of our contemporary; but when we observe how he has mangled and distorted the fair fruits of our laborious lucubrations, we cannot but rejoice that he has spared us the disgrace of putting the name of our work to his metamorphoses. In the "Mechanics' Magazine" for March 12, 1831, (the only one we have at present before us) we cannot forbear making a remark or two upon the *subjects* he has taken from us. Mr. Tuxford's machinery for sifting, this Editor of Mechanics says is "a new *application* of machinery!!"

Mr. Taylor's patent mode of removing the deposits of boilers, which, as our readers will find described at page 293 in our last number, consists of employing a separate chamber below the fire for collecting the sediment, and having a valve for the facility of extracting it, without stopping the working of the boiler; this, the Mechanics' Editor says, is *a modification of Scott's invention!* which consists in suspending trays or slabs of wood or stone inside of the boiler; and the trays or slabs are removed through the man-hole, during which time the engine is of course stopped. (See Register, vol. ii. N. S. page 372.) Now as it must be evident that no two things made for the same object can be more dissimilar, what can have been the motive of the Editor in saying that one was a modification of the other?

We next come to the article on Rawe and Boases' patented improvements on steam carriages; and here we find, that after a pretended description of their inventions which conveys no defined ideas—after stating that a certain part of the apparatus is claimed under their patent, which is *not claimed at all*;—after this, he says "*Messrs. Rawe and Boases' patent is a sad hodge-podge of things old and new, combined with but little mechanical skill, and all claimed as their own by a very extraordinary stretch of fancy.*" Not a word is given, nor even a hint, as to what the Editor calls old, nor wherein the defect of skill is exhibited; and as to "*all*" the mechanism being claimed, the specification which he professes to quote, states at the outset and repeats at the end, that the claims are but four, which are carefully specified, and no others!! After thus falsifying plain written facts, the writer concludes in the following words:—"*We do not risk much in pre-*

dicting that no steam carriage constructed in the manner set forth in their specification will ever grace the road; and still less in saying, that were they to succeed to their heart's content, there would not be a feather in their caps which they could fairly call their own!" On this we shall make no other comment than with respect to the *predictions*, because we know of none in which the events have not turned out precisely the reverse of the prophecies. We have a heap of evidence to prove this were it necessary, and we insert the following letter partly in confirmation of it, but chiefly on account of the interesting facts which it details; the writer we know to be a gentleman of the most perfect integrity and honour :—

BRAITHWAITE & ERICSSON'S STEAM CARRIAGES v. THOSE OF MR. ROBERT STEPHENSON.

TO THE EDITOR.

SIR,—As the merits of Messrs. Braithwaite & Ericsson's locomotive engines have been so exaggerated, so wonderfully puffed, and the public so exceedingly gulled by the statements in a certain periodical notorious for appearing as if the editor was *more than editorially* connected with the success of the above mentioned gentlemen and their "patent principle," I take the liberty of sending you an account of the latest performances of the King William the Fourth, a name that must be familiar to every reader of the Mechanics' Magazine. On Friday, the 18th of February, this engine left Liverpool betwixt 8 and 9 o'clock in the morning, without any load but its tender of coke and water, and performed the journey to Manchester in a little more than two hours; took in coke and water and started again for Liverpool without delay. The Mars, one of Mr. Stephenson's engines, that left Manchester half an hour afterwards with six loaden waggons and two empty ones, overtook the King near the inclined plane at Rainhill, about ten miles from Liverpool, and had the honour of pushing his majesty into Liverpool, at a speed which I believe neither he nor the engineer and his assistants ever had the pleasure of travelling before.

The King (still without a load) left Liverpool again in the evening, directly after the Meteor, one of Mr. Stephenson's small engines, that had six loaden waggons, and overtook them at the inclined plane, and again at the Parkside-water station; the King not requiring water followed directly with the Meteor, and arrived at Manchester about ten minutes later.

The next morning the King William the Fourth left Manchester 17 minutes before 9 o'clock, with five loaden waggons, a gross weight of 20 tons 6 cwt. and the resident engineer at the Manchester end of the line, knowing what had been the results of their former attempts, and the stoppages they had created on the

line, and judging of the probabilities of this intended journey with a load, thought proper to take the Meteor, (the engine generally used for ballasting the road at night, therefore more easily spared,) and follow close behind in case of any assistance being required; and as I was one that accompanied them, I had a very good opportunity of seeing what the King actually could do. He travelled at the rate of 8½ miles per hour; that is about *half the load at half the speed positively contracted for*. This is the average of his speed for the first eleven miles; for various parts of the journey his speed was much less, so much so that some labourers on Chat Moss ran along side, and the fireman of the Meteor got off the tender, ran as far as the King's load and returned again; which might have been frequently done. The eleven miles was as far as the King had an opportunity of taking the load himself; for the Mercury and Arrow, that we met coming into Manchester with goods as we were going out, overtook us, (having left Manchester with goods half an hour after us,) and as it was not prudent to let his majesty loiter on the road to the stoppage and annoyance of the regular traffic, we quickened his pace, driving him and his load forward about 4½ miles till we came to the Parkside-water-station, where there is a crossing, so that the Mercury and Arrow passed by. After a little delay in getting on to the line again we proceeded forward; but as the engine which leaves Manchester at 10 o'clock with the train of coaches was nearly due, it was deemed most prudent to push the King and his load forward to the next sideing, which is at the foot of the inclined plane; before this could be done the Mars came up with the train, and had to stop till we put into the sideing to let them pass. As there appeared no chance of his majesty surmounting the inclined plane with five loaden waggons, from the feeble and *exhausted condition* in which he had travelled from Manchester, the Meteor was sent forward with his load, and he, left either to stay in the sideing where he would not interrupt his betters, or proceed forward to Liverpool alone, the latter of which he accomplished by one o'clock; but how many pounds of coke were consumed, and how many gallons of water evaporated, I believe neither I nor they can tell.

You have no doubt seen it stated repeatedly in the Mechanics' Magazine, that Messrs. Braithwaite & Ericsson had "*positively contracted to make an engine not exceeding* 5 *tons weight, and capable of drawing* 40 *tons gross, at the rate of* 15 *miles an hour, the consumption of coke not to exceed half a pound weight per ton per mile.*"

How far *positively contracting* to do, and *positively doing* are synonymous terms, I leave you to judge; but I think that neither the Liverpool and Manchester Railway Company, nor yet any other Company, would think them synonymous enough to induce them ever to think about using such engines.

By the statements in No. 389, of the Mechanics' Magazine,

from a letter that the Editor received from his *confidential correspondent*, who was an eye witness, " the success of this boiler exceeds the most sanguine expectations of the patentees," so that it appears that their expectations have been very moderate with regard to the generation of steam, which it is needless to remark is an essential point, the most important of all others; and it appears that that is the principal deficiency, or why is it that ever since the 18th of August their principal alterations have been connected with the Fanner? Why has this apparatus been stuck on the top of the flue, above the fire? then taken down and put at the bottom, directly under the fire? and at this last trial under the end of the boiler farthest from the fire, with an extra cylinder fixed along the boiler-side to work it? It appeared from the Saturday's performance that the generation of steam was very insufficient; the engine being almost at a stand-still whenever the force-pump was on. I understand that this unsuccessful attempt is attributed to having lost an oil cup on Friday night, but why have they never done any better? Why cannot this far-famed engine fulfil the *positive contract?* Why was the King William the Fourth with no load, pushed into Liverpool by the Mars? and as one good turn deserves another, why did he not push the Meteor into Manchester that evening, when so close behind, he having the advantage of cylinders an inch more in diameter than the Mars, and two inches more than the Meteor? Why was his majesty mounted on a waggon yesterday and dragged into Liverpool again? Was it not back again to the factory of Fawcett & Co. to comfort his consort Queen Adelaide, during her long confinement there? And what is the reason that the incomparable Novelty (whose fame must have long ago reached the four quarters of the earth,) hath laid aside the powers of locomotion, and passed the last few solitary months in a corner of the warehouses at Manchester, forsaken and neglected by all the host of her admirers, who appear to have thought her unworthy of the smallest of tributes; not even a rub with a greasy cloth to preserve her dazzling splendour from the corrosive effects of the atmosphere, that appear to have made pretty free with the works of the coppersmith and the polished bars and rods of the millwright? Perhaps Mr. Robertson can answer those few questions, as the impression made upon the public from the information contained in the Mechanics' Magazine was undoubtedly, that the locomotives made by Mr. Stephenson were comparative failures to those made by Messrs. Braithwaite & Ericsson, or at any rate if they could manage to carry passengers, goods were quite out of the question. Mr. Robertson appeared to have no doubt at all of these things, indeed how was it possible he could, since he tells us repeatedly that Messrs. B. & E. had *positively contracted* to do them.

Considerably more than *a hundred thousand* passengers, and several thousands of tons of merchandize, have been conveyed along the railway betwixt Liverpool and Manchester, and not one

single passenger, nor one ton of goods by the London engines, though the Mechanics' Magazine hath liberally poured forth its vigorous aid. The greatest part of these passengers have read about the wonderful performances of the King William the Fourth, and inquire what is the reason he is not working on the line; I think it would but be justice to the public, if either Mr. Robertson, or the gentleman whose striking likeness engraved on steel ornaments the 13th volume of the Mechanics' Magazine, were to explain the reasons in the 14th volume, as there appears a lack of information upon subjects suitable to a work of that name. The gentleman who had the honour of petitioning our beloved sovereign for permission to call these engines King William the Fourth and Queen Adelaide, may be proud of the appropriate choice, as kings and queens are seldom known to work, and these appear to be no exception to the royal rule.

As the last account which Mr. Robertson gave of the performance of the King William, from his confidential correspondent and eye witness, was very different from what many hundreds in this part of the kingdom would consider a true account, and there being a great probability that the same correspondent may have sent him another account equally as true, I shall be much obliged by your inserting the above account in your valuable publication, as soon as convenient, unless you think it too tedious.

Salford, Manchester, I remain, Yours, &c.
24th Feb. 1831. AN ENGINEER.

We have before us another account of the foregoing experiments with Messrs. Braithwaite & Ericssons' engines, which coincides with it in every essential particular; and we shall now add by way of contrast to the performance of the Mechanics' Magazine's engines, an account of the performance of one of Mr. Stevenson's engines, on the 25th of February, as published in the "Manchester Guardian" of the following day:—

Extraordinary Performance of Mr. Stevenson's Engine Sampson.

Yesterday morning Mr. Stevenson's engine *Sampson* started from the station at Liverpool with 30 waggons, carrying the following load:—

	Tons.	Cwt.
23 Waggon load of oats	82	10
7 Waggon loads of merchandize	24	15
Total net weight	107	5
Tares of the 30 waggons	42	15
Fifteen persons (chiefly directors and their friends)	1	0

Making a gross weight of *one hundred and fifty-one tons*, (besides the weight of the tender, with its coke, water, &c.) With this enormous load the *Sampson* moved off, as we have already stated, at ten minutes' past eight, and proceeded to the foot of the inclined plane at the rate of about twenty miles an hour. It was assisted up the inclined plane by three other engines, (the *Mars*, the *Mercury*, and the *Arrow*), and arrived at the top in 38 minutes after leaving the station. As the assisting engines pushed behind the load, whilst the *Sampson* tugged in front, it was easy (by observing where the connecting chains were tight, and where slack) to ascertain what portion of the work was done by each: and it was found that the *Sampson* generally drew sixteen waggons (the gross weight of which would be about 80 tons.) On arriving at the top of the inclined plane, the *Sampson* stopped five minutes to take in water, and then proceeded to Park-side, where it arrived at 27 minutes past nine; stopped there eight minutes to water; and arrived in Manchester at sixeen minutes before eleven. The whole time of the journey was consequently two hours and thirty-four minutes; and deducting the thirteen minutes employed in taking in water, the net time of travelling was *two hours and twenty-one minutes*. The quantity of coke consumed by the *Sampson* in this extraordinary journey was 1376 lbs. (12 cwt. 1 qr. 4 lbs.) being *not quite one third of a pound per ton per mile*. Adding to this the coke consumed by the three engines which assisted up the inclined plane, the whole expense of fuel would not amount to twenty shillings!

HUMANE CARRIAGE FOR THE CONVEYANCE OF YOUNG CALVES TO MARKET.

TO THE EDITOR.

SIR,—The ready attention, and the facilities you invariably bestow upon ingenuity, particularly when its object is humanity, induces me to solicit your valuable assistance, by your exhibiting to your numerous readers a simple, yet a most important invention, being calculated to prevent a martyrdom of suffering to our fellow beings.

For ages it has been the disgraceful custom of the calf dealers, in conveying to market sucking calves, to pack great numbers of the poor animals, one lying upon another, into a small cart, with their four legs all tightly bound together, and their heads and necks dangling over the sides of the back and the front of the vehicle; sometimes their very heads resting upon the revolving wheels: and in this pitiable state they travel for several days together, frequently dying on their way. Some, it is true, survive this cruel treatment; but, if not immediately sold to the butchers,

and offered to them for sale many months afterwards, they readily detect them, by their swollen legs and their emaciated appearance.

A practice so barbarous could not escape the notice of the Society for the Prevention of Cruelty to Animals; and, upon a case of this kind having been submitted by it at Worship Street Office, to Mr. Benett, the magistrate, he humanely exerted his influence, as an individual, towards promoting a better plan, and, in conjunction with Mr. Jones (a respectable butcher), produced a model, which in a great degree promised success; but what I now have to offer has been preferred by Mr. Benett to the former plan, and is the joint invention of Mr. Raymond, senior, and his son, Mr. George Raymond, one of the members of the Society.

In this plan the calves are to be carried, *partially suspended*, as sucking calves cannot stand long without support (those calves which are sometimes seen standing in carts being much older); and, as much inconvenience and loss of room is incurred by their lying down, suspension has appeared the best means to pursue.

For this purpose, the inventors have constructed the model of a common cart, which is longitudinally divided in the middle by a rail; these are again divided by a number of oblong cross bars, forming several compartments, about the size of a calf. These cross bars can be removed at pleasure; and they go into square perpendicular grooves, made in the sides and middle rail of the cart, and to each of these bars are attached bands of strong cloth, as wide as the distance between the fore and hind legs of the calf, which forms a kind of hammock for it to lie in, with its feet bearing on the ground, so as to give the calves the liberty of standing, if so inclined, or resting in the band, if fatigued. The length of the bands are easily adjusted to the size of the calves, by taking the cross bars out to which the bands are attached, and twirling the bars round so as to coil up the bands to their proper length, the bars of which are then dropped into the square grooves, so that they cannot turn back and untwine the bands. The compartments, then, being contiguous to each other, require not only to be bounded by single cross bars on each side, but by two, lying over each other, one belonging to the band of one calf, and one to another; and they can then be adjusted independently of each other. At the back of the cart is a tail-board, furnished with spars, slightly projecting, and it lets down by a hinge; so that one end rests upon the ground, and forms an inclined plane, with good foot hold, by which the calves are enabled to ascend the cart. The cart, when not wanted for this purpose, can easily, by removing the rail and the bars, be used for any other work.

Every object has, it appears, been attained by the inventors, who are entitled to the warmest thanks of the friends of the cause; its adoption, however, still remaining to be accomplished, which, it is to be hoped, their perseverance will also soon effect. I herewith send the model for your inspection; but this being somewhat

different, being only intended for a single row of calves, instead of two. I have the honour to be, Sir,

Your's, respectfully,

LEWIS GOMPERTZ.

N. B. At fig. 9, Pl. II. a perspective sketch is given of this carriage, with the supporting bars in their grooves; and, at fig. 10, is an instance of the manner in which the calves are suspended between the bars.

ON SAVERY'S STEAM PUMP, AND WOOD'S WASHING MACHINE.

TO THE EDITOR.

SIR,—In the Register No. XL. you mention a machine as a substitute for a pump, which is no more nor less than Captain Savery's steam pump, or water-raising machine: (see Dr. Desagular's Lectures.) A better steam pump was patented by Jones, of Bristol, and one of them was put up at Landale Distill-house, Holborn, about the year 1778, which was destroyed by fire, in Lord George Gordon's riot, in the year 1780. Another was put up at the distill-house in Bromley, near Bow, now Messrs. Currie's and Co.; and several more, by Mr. Jones and his man Bond, at different places.

In No. 38, for September, is Mr. Fryer's washing machine, both single and double. These were invented by Mr. James Wood, of the Kent Road, and patented. The patent was sold to Mr. Edward Beetham, facing St. Dunstan's Church, Fleet Street, about the year 1790; he had several forms of them, single, double, marine, portable, &c. I have a double one I bought of him in the year 1796, in pretty good condition now.

Your well wisher,

AN OLD MECHANIC.

AMERICAN SILK.

TO THE EDITOR.

SIR,—You have probably observed the notice taken by Mr. Ewart, (on the 15th of February, in the House of Commons,) of the first importation of raw silk from the United States of America, and likewise in the Times of the 24th of February, on the same subject. A subject of sufficient importance to render a more detailed account interesting to the numerous readers of your widely circulated Journal.

Mr. Duponceau, of Philadelphia, the President of the American Philosophical Society, with his usual foresight and patriotism,

long since thought of the advantages to arise from extending the culture of the white mulberry tree, and the propagation of the silk worm, as objects highly important to the United States; where the variety of soil and climate render the mere production of silk easy. But difficulties arose in preparing it for the market. These impediments for a long time delayed the adoption of his plan; though sewing silk has been manufactured in Connecticut, and proved of superior fineness and strength.

M. D'Homergue, of Nismes, in France, paid a visit to Philadelphia, and afforded Mr. Duponceau an opportunity of putting his laudable views into practice, by establishing a Filature under his direction: M. D'Homergue having previously managed one at Nismes, and seen a good deal of the culture and preparation of silk in France, felt sanguine of its success in America.

The result of the first trial has shown, that their labours are likely to be crowned with success.

It was not to be expected, that the American operatives, when first employed in a new, and to them, strange process, should turn out of their hands, an article as well prepared as that furnished by Italy or France; where it has been so long the staple of the country. Yet the sample received, has shown that M. D'Homergue's lessons have been addressed to willing and apt scholars, who will, it is hoped, soon equal the reelers of France or Italy.

It may now be added, that an intelligent gentleman has tried a sample of this silk, in the different processes of winding, throwing, and dying, and the result is highly satisfactory; so much so, that he thinks a fine field is open for the culture of the article in America. The quality he considers superior to India silk generally, and fully equal to Fruli or Treat. He had some of it dyed black (the colour which most tries the silk) and which it takes very well. And concludes by suggesting some improvements in the reeling; which a little more practice may soon effect.

The present importation is a mere sample, being a very small package; and was produced (as the correspondent of the Times states) in Pennsylvania, and reeled from the cocoons in Mr. Duponceau's Filature at Philadelphia, under the direction of M. D'Homergue. It has been submitted to some of the best judges in this country, who think it is a very fair beginning. The texture is finer than the Italian silk, and produces a larger return from the same quantity of cocoons.

Some silk from the same Filature has been boiled, dyed, and woven into very fine stuff, in America; although not thrown, as they have no throwing mills at present there.

Should the production of silk increase as rapidly in America, as cotton has done in the last 30 years, it will become an article of great consequence in our trade with that country. The Americans sending the raw material, and taking back the manufactured article in return, as is now the case with cotton.

The white mulberry tree and silk worm are said to succeed in

almost all the States of the Union, and the latter can be brought forward at the time the former is in leaf.

This subject has been taken up by a Committee of the American Congress, and strongly recommended by them, to the attention of that government and country. And any object that will promote the intercourse or strengthen the ties between the two countries, is well deserving the attention of both.

London, March 26, 1831.

AMERICAN PATENT.

Specification of a Patent for a process or method of purifying, tempering, and preparing the juice of Cane, cultivated and grown in the United States, and rendering it better fit to be converted into Sugar than has hitherto been done Granted to AUGUSTUS ARCHBALD, *Sugar Refiner, of the City of New York, April* 19, 1830.

THIS discovery, application, or invention, consists, *first*, in neutralizing the juice, that is to say, rendering it perfectly free from acidity, without allowing lime, or any other alkali, that may be used to predominate. *Secondly*, in precipitating the impurities, and thereby admitting of its being converted into sugar, with little or no skimming. *Thirdly*, in imparting to the juice the colour or hue that may be desirable for brown sugar.

For carrying into effect this my said improvement, I do operate as follows, that is to say, I do collect in one or more wooden or other vessels, the juice running from the mill; the aforesaid vessel or vessels being arranged and fitted in the interior with a copper pipe, cirulating round the bottom, which may or may not be perforated with holes, as may be deemed most convenient, and so fitted with cocks, and connected with the steam generator, as to allow of the steam being let on and turned off at pleasure; the mode of arranging which pipe, will be understood by any engineer, or coppersmith. The receivers being sufficiently full, I do proceed to purify the juice, and prepare it for being converted into sugar in the manner following. I do mix well with the juice a certain portion of the mixture composed of lime and alum, called *finings*. I do apply the aforesaid mixture in the proportion of two pounds, or thereabouts, to every hundred gallons of juice, the mixture being well stirred with the juice. I do throw in, and stir well with the juice, small portions of good well slacked lime, made perfectly fine before applying it, or any other alkali, (preferring lime, as being most economical) and I do continue to add the same, until the test paper, or any other test that may be used to show the presence of acid, no longer changes colour. I do then examine the juice with the test paper, or other test showing the presence of lime, to ascertain whether I have given an excess of lime, or other alkali, in which case I do let in more fresh juice, in order to neutralize the excess

of lime. Having by this first operation ascertained exactly the quantity of lime requisite to temper or neutralize a given quantity of juice, in all subsequent operations, I do throw in at once the full proportion of lime, and mix it well with the juice, before heating it. The juice being thus perfectly freed from acidity, I do turn on the steam, heat it nearly to the boiling point, or make it so hot that the hand cannot be dipped into it without the danger of scalding. I do then stop the steam, and immediately throw into the juice, and mix well with it, a further portion of the aforesaid mixture, made thin with water, which portion will be determined by observing in a tumbler, or other glass vessel, the rapidity with which the impurities of the juice precipitate; a sufficiency being applied, the juice is allowed to remain till the impurities settle, when the clear liquor is drawn into the evaporators, to be converted into sirup, or sugar, and the residue, or sediment, into another receiver, where it is mixed with a small quantity of hot water, and a small portion of lime, and allowed to settle, when the clear part is drawn off, and converted into sugar with the rest of the juice. Should it be desirable to impart a lighter colour to the aforesaid juice, I do increase the proportion of the aforesaid mixture, after stopping the steam to allow the juice to settle as aforesaid, and I do declare that it is not indispensable to use the aforesaid finings, as the cane juice can be purified, though but very partially, with lime, or any other alkali alone, but the sugar therefrom has a tendency to turn gray, a colour always fatal to it in the grocer's market; besides, the impurities precipitate with difficulty, and the juice is dark.

I have discovered that finings applied to the cane juice as aforesaid, purifies the juice much more perfectly, hastens very considerably the precipitation of the impurities, and imparts to it, which is communicated to the sugar, that beautiful straw orange colour so much admired and desired in brown sugar; and, what is of no less importance, renders the molasses drained from the sugar made from juice that had been treated with it, much more pure and fit to be converted into sugar than it would otherwise be. It has been ascertained that by purifying the cane juice, and precipitating the impurities by the method aforesaid, a very large increase of sugar can be obtained, from a given quantity of cane, beyond what can be extracted when treated by the ordinary processs of tempering and skimming.

The difference between my method of treating and preparing cane juice, and that generally used, consists in my precipitating the impurities thereof, whereas the impurities of the juice have hitherto been got rid of, and that very imperfectly, by skimming. My mode of tempering differs also materially from that usually followed. By my method the exact quantity of lime required by the juice, to correct the acidity therein contained, is applied with ease and precision, and the most ordinary negro, or even a boy, may in a few hours be taught to temper with the greatest correctness; whereas by the method of tempering generally pursued, it requires years of experience, and the most intelligent person; and even then it cannot be

done with any kind of certainty, as sometimes too much lime is given, which makes the sugar dark, and at others too little, in which case it granulates badly, consequently a large quantity of molasses is produced, and it drains with great difficulty. And with regard to the aforesaid mixture of lime and alum, or saturation of lime and alum, called finings, although I do not claim to have invented that compound, it having been long known; having discovered the important and valuable effects produced by it upon cane juice, I do mean to apply for letters patent to entitle me to the exclusive right to the application of the same to cane juice, for the purposes for which I employ it.

I will now proceed to state the method of preparing the aforesaid mixture called finings, which is as follows: a quantity of alum is melted either in a wooden or copper vessel, with its own weight of water, or thereabouts. A quantity of good well slacked lime, mixed with water sufficiently thin to allow the gross particles, or the lime that has not dissolved, to subside, leaving a kind of milk of lime, or very strong lime and water; this lime is then added to the alum, till the test paper showing acidity, changes colour no longer.

The test paper showing the presence of lime is then tried, to ascertain that lime does not predominate, the mixture being made perfectly neuter is then thrown upon a strainer, and allowed to drain off the water when it is fit for use.

My invention, or improvement, upon which I claim in these my letters patent, an exclusive privilege, consists in this, my process, or method, herein specified, of purifying and preparing the juice of the cane grown or cultivated in the United States, intended to be converted into sirup, or sugar. W. A. ARCHBALD.

HOLD-FAST FOR CARPENTERS.

(From the Transactions of the Society of Arts.)

The Sum of FIVE POUNDS *was given to Mr.* W. DUNGEY, *of New Compton Street, Soho, for a Hold-fast for a Carpenter's Bench; a Model of which has been placed in the Society's Repository.*

THE common carpenter's hold-fast is a round bar of iron, thickening a little upwards, and bent at the upper end almost into a right angle, and flattened. An oblique hole is bored in the bench; and if a piece of wood, or any other article, is wanted to be secured, it is placed under the hold-fast, and a few strokes of a mallet are sufficient to make it bite firmly. In order to loosen it, nothing more is necessary than a blow of a hammer applied at the lower end of the bar.

In Mr. Dungey's hold-fast, the jaw *a*, instead of being one piece with the rest of the bar, is moveable on the screwed axis *b*, and is prolonged backwards. In this latter part is a hole for the reception of a cranked screw *c*, which bears on a projection *d* of

the main bar: *e* is the hole in the bench, and *f* is a flat square piece fixed by a loose joint to the jaw *a*. and therefore capable of bearing by its whole surface on any piece of work placed under it. By turning the screw *c* in one direction the work is held fast, and by turning in the other direction it is released. It is considered as likely to be of service to coachmakers, carvers, and chair and cabinet makers, as the pressure of it is under perfect regulation, and it is not liable to bruise the work which it is employed to hold.

PORTABLE EASEL.

(From the Transactions of the Society of Arts.)

The SILVER ISIS MEDAL *was presented to Mr.* A. R. BURT, *of Chester, Miniature Painter, for his Portable Easel; a Model of which has been placed in the Society's Repository.*

THE instrument has been in constant use by the inventor for the last four years, and is by him particularly recommended to the notice of artists who travel. Its height is about six feet, and its form is precisely that of the common easel. The material of which it is constructed is tin plate made into pipe about an inch in diameter, and painted green. The frame is composed of twelve pieces, which fit into one another like the joints of a fishing-rod, and, when dismounted, it packs very conveniently into the *rest*, which is made in the form of a box, two feet long, three inches deep, and four inches high; thus combining, in an eminent degree, cheapness, lightness, stiffness, and portability. It may be put together, or taken to pieces and packed up, in two minutes, and will probably be found a desirable acquisition by the class of artists for whom it is particularly intended.

LIST OF NEW PATENTS SEALED.

DISSOLVING SNOW.—To J. Grime, the younger, of Bury, Lancashire, copper-plate engraver, for a method of dissolving snow and ice on the trams or railways, in order that locomotive steam engines and carriages, &c. may pass over rail roads without obstruction. Specification to be enrolled 21st Feb. 1831, in six months.

STEAM ENGINES.—To R. Trevithick, of St. Aith, Cornwall, for an improved steam engine.—21st Feb. 1831.—Six months.

HEAT.—To R. Trevithick, of St. Aith, for an apparatus for heating apartments.—21st Feb. 1831.—Six months.

LACE.—To W. Sneath, of Isón Green, Nottingham, Lace-maker, for improvements in making, figuring, or ornamenting lace, net, &c.—21st Feb. 1831.—Six months.

INFUSION.—To R. Abbey, of Walthamstow, Gentleman, for a new mode of preparing the leaf of a British plant, for producing a healthy beverage by infusion.—21st Feb. 1831.—Six months.

STEAM.—To S. Dunn, of Southampton, Engineer, for improvements in generating steam.—21st Feb. 1831.—Six months.

MEDICINE.—To R. Burgess, of Northwich, M. D. for a drink for the cure, prevention, or relief of gout, gravel, and other diseases, which may be applied to other purposes.—21st February, 1831.—Two months.

BRINE.—To W. Furnival, of Wharton, Esq. for improvements in evaporating brine.—24th Feb. 1831.—Six months.

BRIDLES.—To J. Phillips, of Arnold, Nottingham, Servant-man, for improvements on bridles.—21st Feb. 1831.—Six months.

SPINNING.—To D. Seldon, of Liverpool, Merchant, for improvements in machinery used to give a degree of consistency to, and to wind on to bobbins, barrels, or spools, rovings of cottons, and the like fibrous substances. Communicated by a foreigner residing abroad —26th Feb. 1831.—Six months.

STEAM ENGINES.—To R. Williams, of College Wharf, Lambeth, Engineer, for improvements in steam engines.—28th Feb. 1831.—Six months.

PROPELLING.—To D. Napier, of Warren Street, Fitzroy Square, Engineer, and J. Napier and W. Napier, for improvements in machinery for propelling locomotive carriages.—4th March, 1831.—Six months.

GLASS, &c.—To A. Pellatt, of Falcon Glass Works, for an improved mode of forming glass vessels and utensils with ornamental figured patterns impressed thereon; partly communicated by a foreigner, and partly discovered by himself.—9th March, 1831.—Six months.

AXLES —To R. Stephenson, of Newcastle-upon-Tyne, Engineer, for an improvement in the axles and parts which form the bearings at the centre of wheels for carriages which are to travel upon edge railways.—11th March, 1831.—Four months.

SPINNING.—To C. Wood, of Macclesfield, Manufacturer, for improvements in machinery for spinning cotton, silk, flax, wool, and other fibrous substances, &c.—11th March, 1831.—Six months.

PAPER.—To G. W. Turner, of Bermondsey, Paper-maker, for improvements in machinery for making paper.—21st March, 1831.—Six months.

OIL OF VITRIOL.—To P. Phillips, jun. of Bristol, Vinegar-maker, for improvements in manufacturing sulphuric acid, commonly called oil of vitriol.—21st March, 1831.—Six months

RUDDERS.—To W. Peeke, of Torquay, Shipwright, and T. Hammick, of the same place, Ship-smith, for improvements in rudder-hangings, and rudders for ships or vessels.—21st March, 1831,—Six months.

SPINNING.—To John Potter and James Potter, of Spiedly, near Manchester, Spinner, for improvements in apparatus applicable to the spinning or twisting cotton, flax, silk, wool, &c.—21st March, 1831.—Six months.

TUBES.—To G Royl, of Wallsall, Stafford, Whitesmith, for an improved method of making iron pipes, tubes, or cylinders.—21st March 1831.—Six months.

TO OUR READERS AND CORRESPONDENTS.

The mislaid letter of "AN OLD MECHANIC" we have now found, and have to thank him for the several corrections he has made; the volume in which they occur being now completed, it will be of no use to notice them. If our correspondent wishes to examine a gas-meter, he will be able to do so at our publisher's, who employs one of the kind he mentions. With respect to putting on the lithographic plates, references to the descriptive text, that could not be done without great inconvenience in the publication of a *periodical* work. The remarks of our friend on the pump and washing machine are inserted in the present number.

The queries of our legal friend "QUERIST" we cannot solve very satisfactorily; but we suppose "the cause" of the one to be owing to a lack of money (not rupees), and the other, owing to a lack of wit; and as we suspect our cause-loving correspondent can supply both those wants to the respective patentees, he perhaps will have the benevolence to see them on the subject.

"A WELL WISHER'S" inquiry we have well considered, and are of opinion that a patent for the invention he mentions would not afford him any remuneration. Similar contrivances have long been, though not very generally, in use.

We are again compelled to postpone Mr. Hooper's communication: but it shall positively be inserted in our next No.

PATENTS ENROLLED BETWEEN 10TH MARCH, AND 10TH APRIL, 1831.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

SADDLE.—To T. Thacher, of Birmingham, a patent for "an elastic self-adapting saddle," was granted on the 7th of September, 1830, and the specification was enrolled in the Enrolment Office on the 3rd of March, 1831.

It is doubtless essential to the ease and comfort of both animals concerned in riding, that the saddle should be made to fit accurately the back on which it is to be applied. And with a view to accomplish this desirable object, Mr. Thacher proposes, in addition to the usual elastic padding, to make the points of the saddle trees of elastic steel plates, that they may cause the side flaps to apply closely to the sides of any horse on which the saddle may be put. On the exterior of the side pads are attached leather pockets to receive the ends of the elastic plates. The side pads are secured in their places by straps extending from the top of the fore part of the saddle-tree, in a direction sloping downwards to the back part, and passing through loops in the padding.

The other parts of this saddle do not materially differ from the corresponding parts of saddles as they are generally manufactured; and, therefore, we have not deemed it necessary to detail them here, although they are all described in the specification of this invention.

GIG AND CARRIAGE ACCIDENTS, TO PREVENT.—To Peter Williams, of Holywell, in the county of Flint, Surgeon, a patent for "an apparatus or contrivance for preventing accidents in carriages, gigs, and other vehicles, instantly and effectually liberating horses or other animals from the same, when in danger, or otherwise; and for locking and securing the wheels thereof in cases of danger, emergency, or otherwise," was granted on the 7th of September, 1830, and the specification was enrolled in the Enrolment Office on the 7th of March, 1831.

The objects of this patentee are fully pointed out in the title of his invention; and he proposes to effect the first, namely, the instant release of the horses from the gig or other vehicle, by affixing the harness to the splinter bar or shafts, by means of hooks which fold down and let slip the loop or link which forms the connection. The hooks are kept in their places by means of pins passing through holes and connecting their extremities with the splinter

bar: and when the horse is to be detached, these pins are to be simultaneously withdrawn; being attached to a series of bent levers connected together, and brought through the medium of a rein or cord within the reach of the driver or person sitting in the the carriage.

The danger arising from the gig falling upon its shafts when the horse is suddenly detached, is obviated by fixing under the fore part of the gig a strong projection, reaching very nearly to the ground, and furnished at its lower extremity with two small wheels or anti-friction rollers, which will support the gig in a horizontal position when the support of the horse is removed.

Mr. Williams proposes three plans of locking and securing the wheels, or retarding the motion of carriage wheels in cases of danger. In the first place, he proposes to apply to the naves of the wheels brakes or friction bands, precisely similar to those employed in stopping or retarding the motion of cranes when used in raising and lowering heavy weights. In the second place, he proposes to attach ratchet wheels on the ends of the naves and clicks, with levers to bring them into action with the teeth of the ratchet wheels attached to the axle-tree, and kept at a small distance from the ratchet teeth till the wheel requires to be locked. There is also a ratchet wheel, with teeth projecting inwards towards the axle, set in a contrary direction from those on the exterior: and these are to be used to prevent the carriage from being backed into any dangerous situation. His third plan is to retard the motion of the wheel by the application of a brake on the tire. This brake is kept suspended immediately over the wheel, and it is to be forced down upon the tire by means of a lever of considerable power. The means of applying all the stops is brought by cords or reins within the reach of the driver, or person within the carriage.

LOCOMOTIVE ENGINES.—To Charles Blaker Vignoles, of Furnival's Inn, London, and John Ericsson, of Brook Street, Fitzroy Square, in the county of Middlesex, Civil Engineer, a patent for "certain additions to the engines commonly called locomotive engines," was granted on the 7th of September, 1830, and the specification was enrolled in the Enrolment Office on the 7th of March, 1831.

One of the chief difficulties in the application of locomotive carriages to railways, has been to obtain sufficient friction or adhesion between the driving wheels and the rails to cause them to

ascend inclined planes; as the wheels are in such cases apt to be turned round without advancing the carriage. To prevent this, Messrs. Vignoles & Ericsson propose to introduce a third or friction rail between the two bearing rails. This friction rail consists of a flat piece of iron extending along the middle of the road, and securely fixed in a vertical position, as represented in section by fig. 1, Pl. III. On each side of this friction rail, which is made of considerable depth, is placed a horizontal friction roller, as shown at *c d*. The roller *c* being made considerably larger than *d*, and fixed upon its vertical shaft *e*, while *d* is permitted to turn freely on its vertical shaft *f*. On the driving axis *g* is fixed a bevil wheel *h*, which turns another bevil wheel *i*, fixed upon the vertical shaft *e* of the driving roller *c*. The bearings of this driving roller and its shaft are firmly fixed to the under side of the locomotive carriage by the block shown at *k*, and the bearings of the friction roller *d* are hinged to the block at *l*, that it may at pleasure be pressed against the friction rail *a* by the lever *m*. This lever is brought by bending within reach of the engineer or his assistant; who acting upon the long arm of a powerful lever causes any degree of pressure upon the friction rail by *nipping* it between the rollers *c* and *d*: at the same time the driving wheels *n* and *o* of the carriage are released, and permitted to turn independently of the driving axis *g*, by shifting the binding rings *p* and *q*. When the friction driving apparatus is in action, the wheels *n* and *o* become simply supporting wheels, and run on the supporting rails *r r*. The patentees confine their claim to the driving apparatus which we have described, though they state that it may be put in motion through the medium of the driving axis, by the steam engine employed to actuate the driving wheels of the usual construction, or a separate cylinder may be employed to give motion to the patent driving apparatus. The depth of the friction rail *a* must necessarily be varied to correspond with the inclination of the steepest plane on which it is to be applied.

There is evidently considerable ingenuity displayed in these arrangements, but we doubt whether the patentees have hit upon the readiest way of obtaining an increase of adhesion by an increase of the surface, and pressure of the moveable and stationary parts in contact.

COCKS FOR THE SUPPLY OF WATER.—To William Cook, of Red Cross Square, Cripplegate, in the City of London, Tinworker, a patent for "certain improvements on cocks for supplying kitchen ranges and cooking apparatus with water, and for other purposes, to be called 'fountain cocks,'" was granted on the 7th of September, 1830, and the specification was enrolled in the Enrolment Office on the 7th of March, 1831.

This fountain cock is intended to regulate the supply of cold water to the boilers of kitchen ranges, to correspond with the quantity of hot water drawn off, instead of the ball cocks usually employed for that purpose.

The invention consists of a cock with two water ways or passages, which are opened and closed at the same time; the one for drawing off hot water, and the other for the admission of cold. The nature of the arrangement will be rendered apparent by inspecting fig. 2, Pl. III. where *a a* represents a portion of the boiler *b b*, the hot water passage which receives the hot water near the top of the boiler, and conveys it through the cock precisely in the usual manner. *c c* is the cold water pipe which receives its supply from a cistern situated in any convenient position higher than the boiler, and conveys it through two longitudinal passages *d e* in the inner end of the cock, and through a semicircular passage *f* in the conical plug *g*. These passages are shown in the vertical section fig. 2, and the horizontal section fig. 3.

It is evident that when the handle of the cock plug is turned in the position represented by fig. 2, that both passages will be open, and cold water will be admitted to supply the place of any quantity of hot water drawn off; but when it is turned a quarter of a revolution both passages will be stopped.

When the surface of the water in the boiler descends below the mouth of the pipe *b b*, no water can be drawn till a sufficient quantity of cold has been admitted to raise the hot water above the entrance of the discharge pipe: and this we conceive to be a defect in the apparatus; as the admission of cold water under this and other circumstances, will so cool the contents as to prevent the possibility of obtaining from the boiler at any time a large quantity of boiling water. There is, likewise, some danger of the boiler becoming empty by evaporation, whenever it happens that no hot water is required to be drawn off for a considerable time; and then the boiler would become red hot, and liable to be cracked by the instant supply of cold water when the cock is turned.

SKATES.—To John and George Rodgers, of Sheffield, in the county of York, Cutlers, and Thomas Fellows, Jun. of New Cross, Deptford, Gentleman, a patent for "an improved skate" was granted on the 18th of January, 1830, and the specification was enrolled in the Enrolment Office on the 18th of March, 1831.

These patentees propose to substitute for the wooden sole or frame into which the skate irons are usually fixed, an elastic sole made of steel. Near the middle of the fore part of this elastic sole, where the chief weight rests in the act of stepping, the skate iron is to be fixed, by rivetting, and secured in its place by flanges projecting on each side. The heel of the skate iron is enlarged and the sole also strengthened at the place of contact, that more firmness in the support may be obtained; but the skate iron is not fixed to the elastic plate at the heel. The portion of the sole plate which extends from the attachment to the skate iron is at liberty to move up and down with the toes, and the heel of the sole plate is made to stand when at liberty at some distance from the skate iron, so that it will always keep tight to the sole of the shoe during the motion of the foot. By this means the feet of the skater will be much more susceptible of motion, and hence much more at ease than when subjected to the restraint of skates of the usual construction.

These patent skates are secured to the feet by a fore strap attached to the elastic plate, where it is united with the skate iron and a back strap which passes through a slit in the heel of the skate iron and is brought round the ancle, and made secure by buckling, in the usual manner.

GAS LIGHTING.—To Michael Donovan, of Dublin, a patent for "an improved method of lighting places with gas," was granted on the 6th of October, 1830, and the specification was enrolled in the Enrolment Office on the 6th of April, 1831.

It is a well known fact that hydrogen gas obtained from the decomposition of water by its being passed through red hot iron, or masses of ignited charcoal, will readily burn if lighted when it comes in contact with the oxygen of the atmosphere as it issues from a pipe; and that its powers under such circumstances, are so small as to render pure hydrogen inapplicable to the purposes of gas lighting. To augment the illuminating properties of hydrogen generated under such circumstances, by the admixture of some other gaseous material, is the object of Mr. Donovan's invention. He proposes to convert spirits of turpentine or similar substance

into vapour by the heat of the gas burner itself in the following manner :—

The hydrogen gas in its passage to the burner passes through a metallic cavity immediately connected with the burner; and in this cavity is introduced a quantity of wire gauze to give extended metallic surface. Into the interior of this cavity is introduced a constant supply of turpentine, which being spread over the metallic surface of the wire gauze, becomes by the heat of the burner, converted into vapour in the cavity where it mixes with the hydrogen; giving to it sufficient quantity of carbon to produce the illuminating powers required. If too much of the vapour of turpentine be mixed with the gas, the issue of an inconvenient quantity of smoke from the burner will take place; and when too small a proportion of this vapour is introduced, a deficiency of light will be the consequence: and therefore, great care must be taken to proportionate the size of the burner, the supply of hydrogen, the size of the metallic cavity and surface, and the supply of turpentine, to produce the greatest quantity of light with the least smoke.

PAPER MANUFACTURE.—To John Dickinson, of Nash Mill, in the parish of Abbott's Langley, in the county of Hertford, Esq. a patent for "an improved method of manufacturing paper, by means of machinery," was granted on the 6th of October, 1830, and the specification was lodged in the Enrolment Office on the 6th of April, 1831.

This patent is for an addition to the paper machines formerly patented by Mr. Dickinson, or any other paper machines, by which thicker paper, of a better quality, can be produced.

It is proposed to employ two cylinders in taking up the pulp from separate troughs at the same time, from each of which a web of wet paper is conveyed, by means of endless felts to a pair of pressure rollers, where they are united by pressure, and the manufacture of the paper completed precisely in the usual manner.

To have a clear idea of this improvement it is only necessary to consider, that a duplicate of the pulp cylinder of the common machines is introduced in any convenient situation, governed by the localities of the mill; to be actuated by the same machinery which turns the first cylinder, and, therefore, we have not deemed a drawing or detailed description of the invention requisite.

ANCHORS.—To Richard Perring, of Exmouth, Devonshire, Esq. a patent for "an improvement or improvements in anchors," was granted on the 6th of October, 1830, and the specification was lodged in the Enrolment Office on the 6th of April, 1831.

To obtain greater strength without increase of materials in the construction of anchors, is the important object of this patentee, though it would appear from his title that he is in doubt whether he has invented one or more improvements.

Having discovered that the principal strain on an anchor, whether on the shank or fluke arms, will be in the direction of these arms or at right angles to the stock, he proposes to increase the dimensions of the various parts of the anchor in that direction and diminish their dimensions in the contrary direction; so that the section of the shank will be lozenge shaped with the largest diameter in the direction of the fluke arms.

The patentee further proposes to increase the strength of the anchors by separating the lower extremity of the shank into two portions, and turning them back in opposite directions to form part of the fluke arms. On the exterior or lower side of these is welded a piece which extends as far or further than the length of the bent parts, and forms with them a kind of truss, which gives great strength to that part of the anchor which is most liable to fracture. Another advantage of this arrangement, is the preservation of the longitudinal fibres of the iron in that direction in which they will be most efficacious in resisting the strain.

The patentee confines his claim, first, to the separating the lower end of the shank into two parts, and turning them in opposite directions, to get the advantage of the continuous fibres of the iron at the junction of the shank with the fluke arms: secondly, to the application of the piece constituting the truss above described: and thirdly, to the increased dimensions of the anchor in the direction of the strain, and a corresponding diminution of dimensions in the contrary direction.

HORSES' LEGS AND FEET GUARDS.—To Benjamin Rotch, of Furnival's Inn, in the county of Middlesex, Barrister at Law, a patent for "improved guards or protectors for horses legs and feet, under certain circumstances," was granted on the 20th of March, 1830, and the specification was enrolled in the Enrolment Office on the 18th of March, 1831.

The improved guards here contemplated are to be made of

caoutchouc. When it is to be applied to a horse's foot the neck is to be cut from a caoutchouc bottle, it is then to be softened by immersion in hot water, and drawn over a block made in the form and size of the foot for which it is intended. On this block it is permitted to cool, when it will retain its shape, and by its elasticity it will adhere to the horse's foot when drawn on to it. On the exterior of this shoe is to be applied a sole of sheet iron, made of sufficient size to allow of its edges being cut and turned up round the hoof, to keep it on the foot, but it is also fastened to the Indian rubber by means of rivets with very broad and thin round-headed rivets; and to the iron sole may be fastened if required, horse shoes of the usual form.

A method of making and applying the guards for the legs of horses is next described in the specification. For this purpose both the top and bottom of the caoutchouc bottle are to be cut off, the middle piece is then to be soaked in hot water to soften it, and cooled on an appropriate block, as before. One or more of the elastic bands thus prepared are to be applied to such of the legs or to the knees of the animal, as require protection. And they will be preserved in their places by the elastic nature of the substance. When they have been laying by in cold weather they are apt to get hard, and in that case it is recommended that they should be warmed before they are applied. When they are to be used as bandages it may be sometimes necessary to cut them and fasten them with straps and buckles, and in that case the straps must be attached to the caoutchouc, at some distance from the edge, otherwise they will be apt to be torn off.

The drawings attached to the specification represent a horse's fore and hind leg, with the guards applied to the feet and fetlock, and to the knee, as well as at the top and bottom of a cloth with a poultice applied to the leg.

With respect to the time *(twelve months)* which this patentee has obtained for preparing his specification, we think it deserves notice as a curious illustration of the *laws' delay*; for no body but a lawyer would have thought of requiring, and very few whould have had the means of obtaining, a whole year to mature and describe that which almost any person at all acquainted with the subject would have readily accomplished in half an hour; for here are neither delicate experimental investigation, requiring time to mature and repetition to confirm, nor intricated mechanical construction, requiring the confidential aid of others to bring to perfection.

We consider that the different periods allowed by the present practice to different patentees for the enrolment of their specifications, is one of the principal defects of the system: and Mr. Rotch, from the experience that he has had in that branch, and to which he recently said to a Committee of the House of Commons, that he had directed particular attention, cannot but be aware, that if A, for instance, takes out a patent for an improvement in the steam engine, and obtains twelve months to enrol the same; and B subsequently takes out a patent also for improvements in the steam engine, and obtains but two, four, or six months to enrol his specification, there is nothing to prevent A from inspecting B's specification in the Enrolment Office, and adopting it as his own; as he was not required to give any description of his invention at the time he obtained the patent.

It is not a little singular, that Benjamin Rotch, Esq. of Bath, on the 11th of May, 1816, took out a patent for "a flexible elastic horse shoe," consisting of "two or more pieces of iron, steel, or any other metal, attached either by the nails which fasten the shoe to the foot, or by rivets expressly for the purpose, or sometimes by both, or otherwise fastened or applied to one or more pieces of leather, hat, *indian rubber*, or any other flexible substance." The application to this circumstance of the following extract from the evidence of Benjamin Rotch, before a Committee of the House of Commons, on the Patent Laws, will readily occur to the reader:—

"Look (says he) at the danger of allowing patents for improvements, even with the consent of the party, on articles that are already patented; it would continue a patent *ad infinitum*: improvement on improvement, just as their fourteen years are expired; because it is what patentees come to me constantly to know, if they cannot, for some little improvement, obtain a patent on their own patent, which would be an extension of the term to twenty-eight years instead of fourteen, and thereby shut the public out of the benefit they are to have at the end of fourteen years."

Now it would be very interesting to know whether Benjamin Rotch, of Bath, in 1816, be any relation, or at all connected with Benjamin Rotch, of London, in 1830.

SPINNING.—To Francis Molyneux, of Hampstead, in the county of Middlesex, Gentleman, and William Bundy, of Kentish Town, in the same county, Merchant, a patent for "certain im-

provements in machinery for spinning and twisting silk and wool, and for roving, spinning, and twisting cotton, flax, hemp, and other fibrous substances," was granted on the 21st of September, 1830, and the specification was enrolled in the Rolls Chapel Office on the 9th of March, 1831.

These patentees have introduced into their specification a variety of useful modifications of the motions principally connected with the twisting and taking up parts of spinning machines, which are all minutely described by numerous drawings, which our limited space prevents us from giving. One of the plans, is to regulate the motion of the bobbin, and consequently, its taking up by the pressure of a spring; and by this means great facility of adjustment is obtained. Another method consists in placing the bobbin horizontally on a vertical revolving hollow spindle. On the top of a stationary axis, is fixed a horizontal bevil wheel, which communicates motion to the bobbin by means of a bevil wheel attached to one of its ends. The end of the bobbin opposite the bevil wheel is made somewhat heavier than the other, that the centrefugal force of the revolving mass may retain the two bevil wheels in contact. The thread is conveyed to the bobbin over a horizontal rod extending in the same direction as the axis of the bobbin, but placed somewhat angularly with respect to it.

A doubling and twisting apparatus is next described; and in this, a stationary band is made to put in motion a series of bobbins placed on a revolving frame; and the threads are brought together below the bobbins and twisted by means of the revolutions of the frame which carries them.

Iron Boats.—To William Church, of Haywood House, Birdsley Green, near Birmingham, in the county of Warwick, Esq. a patent for "certain improvements in the construction of boats and other vessels; a part of which improvements are applicable to the construction of carriages," was granted on the 21st of July, 1830, and the specification was enrolled in the Rolls Chapel Office on the 9th of March, 1831.

Mr. Church proposes to employ sheet iron in the construction of boats and other vessels, as well as for railway carriages. The iron plates are to be united by riveting in a manner similar to that adopted in the construction of steam boilers; and the joints must be all made air and water tight. The exterior of the boat thus formed, is furnished with a lining similarly constructed. A space of a few inches is left between the exterior casing and the

lining; and in this space is introduced a series of iron plates bent into the form represented by fig. 4, Pl. III., to give strength to the vessel. These strengthening plates are secured to the casing and lining by rivets or bolts, and the space between the linings is enclosed at the top air tight; and by that means much buoyancy is obtained from it in cases of danger when the boat fills with water. The deck of the vessel is also to be made of plate iron, which is to be secured and strengthened in a manner precisely similar.

To prevent the mast from being injured by the edges of the iron plates, a piece of iron tube, of dimensions to correspond with the diameter of the lower end of the mast, is introduced through, and firmly secured to the deck.

The top rail of the bull-works is made of iron tubing connected together by passing their ends into sockets, and connected with the sides of the vessel by iron plates bent in the form of the surface of a pantile roof to give them strength.

BRICK MAKING.—To S. R. Bakewell, of No. 9, Whiskin Street, Clerkenwell, a patent for "certain improvements in machinery, apparatus, or implements to be used in the manufacture of bricks, tiles, and other articles to be formed or made of clay, or other plastic materials," was granted on the 18th of August, 1830, and the specification was enrolled in the Rolls Chapel Office on the 18th of February, 1831.

The machinery patented by Mr. Bakewell are of two kinds; the one applicable to the tempering or preparing of the clay and brick earth, and the other to the pressure or condensation of the brick in the completion of its conformation.

The apparatus used in grinding, mixing, and tempering the clay consists, of an annular trough of considerable capacity, with a circular horse path on its exterior.

From the centre of the space within the circle, constituting the the inner side of this trough, a radial bar proceeds to the horse path, and on this bar is placed one or more large rollers, which turn on their edges in the trough, and by that means grind and mix the clay or brick earth supplied to the trough. As the width of the trough considerably exceeds the length of the cylinder constituting the grinding roller, it becomes necessary, while this cylinder is rolled round in the trough by the application of a horse or other power to the extremity of the radial bar, to cause it alternately to recede from and approach to the centre of motion,

to an extent equal to the width of the trough, so that the clay in every part of the trough will be subjected to pressure.

Mr. Bakewell has several plans for causing this traversing of the grinding roller. The first is by means of an exterior screw on the radial bar turning in an interior screw or nut in the centre of the cylinder, which will cause it to approach to the centre of motion when it is rolled in one direction, or to recede from it when it is rolled in the other. This plan which has simplicity and the property of self action to recommend it, has the disadvantage of requiring the horse to be turned, and to travel in a different direction whenever the motion of the roller is required to be reversed. In a second modification of this plan the radial bar is lengthened and shortened by means of an exterior screw on its inner end, and turning in an interior screw or nut in the top of the central spindle round which it moves. It is evident, however, that this plan requires an attendant to turn the screw forwards and backwards as the roller is required to approach and recede. Instead of this screw motion at the centre, a rack and pinion are sometimes to be substituted, and these are either to be put in action by an attendant, or they are to be rendered self acting by a train of wheels, consisting of a horizontal spur wheel, fixed over the centre of motion, with a hole to permit the vertical spindle to turn freely within it. Around this is carried a similar spur wheel, whose axis turning in a piece of frame work fixed on and turning with the centre spindle. On the upper end of the axis of this second wheel is fixed a pinion, whose teeth take into and act upon a rack, consisting of a series of pins projecting downwards from the under side of the radial bar. When this pinion has moved the rack till it reaches the extremity the motion of the rack is reversed, while the motion of the wheels continues in the same direction by the rack shifting over to the other side of the pinion, as in the case of Christie's iron triangle, described at page 168, in the first volume of the second series of the *Register of Arts*.

In other modifications of the mill, the roller is made to approach to or recede from the centre pin, by sliding itself upon the bar, which is set out of the direction of a radius to the great circle, by being centred upon a pin in an arm projecting from the centre post, thus placing the carrying bar in the direction of a tangent to a smaller circle in the centre. As the inner end of the carrying bar is placed on one or the other side of the centre pin of the great circle, the tendency of the tempering roller is to

slide inwards or outwards on the bar. The carrying bar is set out of the radial direction in one case by a sector and pinion, and in another by barrels and chains, or ropes.

These mills, no doubt, will grind more uniformly and temper more completely, the materials employed in brick-making, than those in common use about London, where, with greater parade of preparation, they produce unquestionably a more fragile and less durable brick than was made ages ago in the infancy of the arts, and is still made with the least artificial means in the most obscure corners of this kingdom.

The second part of the brick machinery patented by Mr. Bakewell, consists of a press for condensing and rendering the bricks more compact, and of a more regular form than can be accomplished by the usual process. His brick press consists of a rectangular vertical cavity, of length and breadth corresponding with those dimensions of the intended bricks. In this cavity a piston is fitted to move freely up and down in it; and over it is brought a resisting block, which is supported on two bars vibrating on a centre near the bottom of the frame. By this means the resisting block can be brought over the brick cavity, or removed from it, with the greatest facility. The piston rod descends nearly to the bottom of the frame, where it rests upon the shortest arm of a strong lever; the longer arm of the lever being connected by a sling or connecting link with a projecting arm, from an axis extending across the frame, and put in motion by a lever handle of considerable power. The positions of these levers are so arranged with respect to each other, that the arm projecting from the cross axis may assume, at the termination of the pressure, a vertical position, by which the power of the press is for an instant unlimited; and by this means the thickness of the bricks is regulated, and their uniformity secured.

When the brick has been rudely shaped it is put into the rectangular cavity—the resisting block brought over it, and the piston forced up by the means already described. The resisting block is then turned back, and the brick is forced out of the cavity by raising the piston through a second system of levers similar to the first, but of greater range of motion and less power of action.

Some specimens, which accompany the models of these inventions in the National Repository, show that bricks may, by the aid of pressure applied to a good material, be made as solid and regular in size and form as have ever been produced, either by the Romans or by any other nation of antiquity; whose buildings

still exist to attest the superiority with which some of the most important arts of life have been practised in times and places that could not pretend to so much knowledge as is within the reach of the artizans of our own age and country.

SUGAR.—To William Augustus Archbald, of Vere Street, Cavendish Square, in the county of Middlesex, Gentleman, a patent for "an improvement in the preparing or making of certain sugar," was granted on the 13th October, 1830, and the specification was enrolled in the Enrolment Office, on the 24th of March, 1831.

It is not a little remarkable, that a patent taken out by Mr. M. Robinson, on the 5th August, 1830, (see page 302 in our last volume) and enrolled on the 3d of March, 1831, stated to have been communicated to the patentee by a foreigner; an American patent, taken out by Augustus Archbald of New York, an the 19th of April 1830, (see page 28, present volume) and the patent before us, taken out on the 13th of October 1830, should all be the same both in principle and details.

Mr. Archbald alludes, in commencing his specification, to the patent lately granted to Mr. Robinson, and states, that he intends to adopt the same plan at the commencement of his process; he proposes to take the cane juice which is to be operated upon, and mix well with it finings composed of a saturation of alum and lime, in the proportion of about two pounds of finings, diluted in pure water, to every one hundred gallons of juice; and having stirred the same up with the juice, he next proceeds to render the juice perfectly neutral, so that there be no excess of either acid or alkali; and the method which he proposes for neutralizing the juice, and for ascertaining when the neutralization is perfect, is to mix with the juice lime dissolved in water, and made into what is commonly called milk of lime, which should be made sufficiently thin to allow the undissolved particles of lime to subside, and give to the water the appearance of milk; using such milk of lime in the first instance in small portions, and adding thereto from time to time until it is ascertained in the manner, and by the experiments hereinafter mentioned, that sufficient milk of lime has been applied. After each throwing in, or addition of the milk of lime, the liquor must be carefully examined with any one of the test papers, commonly used for detecting the presence of acids in liquids. When this paper has ceased to exchange its colour, the liquor must be examined with

one of the test-papers commonly employed for detecting the presence of alkali in liquids, in order to ascertain whether too much milk of lime has been applied, in which case more of the juice must be added, until the last mentioned test-paper has ceased to change its colour; and in this manner fresh portions of the milk of lime, or of the juice, must be supplied, according to the indications of the respective test-papers, until no change is perceptible on either of the test-papers, which will be the case when the juice becomes perfectly neutral. The liquid is next to be heated, until it has nearly reached the boiling point or degree, taking care, however, not to allow it actually to boil. The method of heating by steam passing through a coiled copper pipe, is preferred by the patentee.

A further quantity of finings is then employed in the proportion of from five to ten pounds diluted to every hundred gallons of juice, gradually increasing the quantity till the additions cease to cause an increased precipitation of the impurities.

The liquor being allowed to remain at rest till the heavier impurities are precipitated to the bottom, and the lighter impurities float on the surface. Cocks inserted in the purifying vessel at different depths, are then successively employed to separate the lighter impurities, the purified liquor and the heavier impurities. The precipitate is afterwards to be diluted with warm water, and subjected to a second purification similar to the first.

The patentee then proceeds to boil the liquor into syrup or sugar, according to Mr. Howard's patent method; only it is proposed in this instance to communicate the heat by high pressure steam of about thirty-five pounds on the square inch.

As it is perfectly evident that the three patents alluded to at the commencement of this notice are all for the very same invention, the public are therefore entitled to some information from the patentees as to the original inventor.

FIRE ARMS.—To W. W. Richards, of Birmingham, for "improvements in the touch-holes and primer, suitable to percussion guns, pistols, and all sorts of fire arms fired upon that principle," was granted the 11th of February 1831, and the specification was enrolled in the Rolls Chapel Office on the 9th of April 1831.

This invention is intended to prevent those accidents that sometimes occur by the explosion of the ordinary percussion cap, by which, in many instances, the face or eyes of the sportsman have been seriously injured.

The nipple, or small tube on which the percussion cap is placed previous to firing, is much longer than those usually employed. This is enclosed in a small cylinder, open at the top, which the inventor calls a shield, and having an aperture at the side farthest from the stock, to permit the escape of the smoke after explosion. The cap, or primer, a tube containing the percussion powder, is provided with bent springs attached to the upper extremity, so that when placed on the nipple, and within the shield, the springs embrace the outside of the shield, and the cap is kept firmly in its place, even during explosion, but should it burst as the other caps do, the shield will prevent the fragments from being scattered around. The primer may be replenished with percussion powder after use any number of times, therefore, although the first cost is greater than that of the usual percussion cap, it is eventually more economical, and the danger of accident is entirely obviated.

BERNHARD'S PATENT PLAN OF RAISING WATER AND OTHER FLUIDS.*

We have received from Mr. Thomas P. Hooper, of 14, Norfolk Street, Park Lane, the following translation of an extract from a report drawn up by M. Von Hungerkausen, Royal Notary at Munich, and attested by twelve eye witnesses, October 1830, concerning an experiment made with Bernhard's patent apparatus for raising fluids (in this case adapted for quicksilver) on the 24th of September, at the Mathematico-Mechanical Institution of M. T. Ertel.

After describing the construction and use of the different parts of the apparatus the report sets forth as follows.

"That on the said day the filling pipe or tube was filled with quicksilver, to the length of 3 feet 3 inches, (measuring from the floor upwards) and through it the heating apparatus, to which fire was then applied.

"As soon as the quicksilver was held to be sufficiently heated the operation was begun, by pumping out the air and creating a vacuum in the apparatus.

"After about a quarter of an hour's pumping the vacuo-meter stood at 25 inches, and the quicksilver in the ascending pipe began to flow out with great velocity *and in an unbroken stream*

* See a description and drawing of this apparatus, Vol. iii. N. S. p. 161.

through a cock placed about 6 feet above the level of the quicksilver, and as this rock could not be speedily closed, there ran out at this point, in the space of ten to fifteen minutes, nearly 40 lbs. of quicksilver, although the bore of the cock was scarcely a line in diameter.

"At last the cock was stopped, and some little time afterwards the quicksilver rose to the second cock, 13 feet 9 inches above the level of the quicksilver in the filling tube. The cock was here also opened twice, but only a small portion of the fluid was drawn off on each occasion.

"The quicksilver appeared at both cocks in its natural fluid state, and there was no perceptible difference between it when drawn off, after being heated, and the same metal cold.

"At last the quicksilver rose into the cooling apparatus, 14 feet 4 inches above the level, (equal to a column of water of about 200 feet high) flowed through the glass descending tube into the reservoir, and out of this through the returning pipe, back into the filling pipe, thus effecting the circulation, and accomplishing the object proposed."

[Mr. Hooper prefaces this extract by a long account of a long discussion between Mr. Bernhard and certain correspondents of Newton's Journal and the Repertory of Patent Inventions, which being carried on without sufficient data on either side becomes vague, uninteresting, and useless, we have therefore not deemed it advisable to introduce any part of it; he concludes his letter to us in the following terms.]

Now, Sir, I trust I need not add, that provided Mr. Bernhard could only prove, that his machine will be less expensive (power for power) than the steam engine, you would readily raise your voice to aid him in his attempts to supersede that frightfully dangerous prime mover. It must be admitted that this part of Mr. B.'s case requires proof, and my object in troubling you at this length, is, simply to ask you to favour the public with your opinion, as a journalist and scientific man, on the possibility and probability of his making out this portion of his claim, feeling assured if such opinion should, as I trust it will, be in his favour, the battle is won; for then doubtless offers would soon be made by capitalists to join him in bringing forward his invention, not only with a view to a share in the immense profits which must result, if successful, but also to a joint tenancy in Mr. Bernhard's fame as a benefactor to the human race. Should however I be mistaken in my anticipation of your being able to pronounce a favourable opinion on this invention, I should still be gratified by your noticing this communication, as Mr. Bernhard's wish is, to court the further observations of scientific men on this subject, and especially on the Munich experiment.

I have the honour to be, Sir,

Your very obedient Servant,

L. Hebert, Esq. THOMAS P. HOOPER.

Now to this we readily reply, that neither Mr. Bernhard nor his friends have furnished sufficient data on which can be formed an opinion that could prove useful to the patentee or to any body else.

We have before us a copy of the specification, in which the principle and action of the apparatus are described in terms so vague that little dependance can be placed upon them. We have besides this, an account of some experiments made on a large scale in the Kent Road, near the Surry Canal.

To the top of a tower 70 feet high, water is said to have been raised, and to have been discharged at a height of 80 feet; and the editor of the London Journal of Patent Inventions is said to have seen *considerable volumes* of water raised from time to time, during the experiment, to the top of the shaft (nearly 70 feet), and at *intervals* discharged therefrom. All this, however, is perfectly useless; for we cannot even guess at the quantity of water which constitutes a *volume*, in the idea of our contemporary, or the duration of his *intervals*; and we are left equally in the dark as to the quantity of the fuel used in raising these volumes of water. We must confess that all this leaves impressions on the mind exceedingly unfavourable to Mr. Bernhard's invention. That he could have expended several thousands of pounds in the erection of an extensive apparatus, and then conceal the quantity of fuel required to raise a given quantity of water to a given height, if favourable to his invention, cannot be credited: nor will it be believed, that Mr. Bernard was ignorant of the quantity of fuel consumed, the quantity of power expended on the air pump, and the quantity of water raised to a given height. One thing is very certain, that according to his own statement, the temperature of *all* the water raised must be elevated from the ordinary temperature of water to about 140°.

With respect to the report of M. Von Hungerhausen we are no better provided with data from which to form an opinion; we are only informed, that by the application of fire and a quarter of an hour's working of an air pump that nearly 40 pounds of quicksilver was raised in the space of 10 to 15 minutes the height of 6 feet. Now, is it not manifest, that a man working with a force pump, for "a quarter of an hour," would raise much more than 40 pounds of quicksilver to the height of 6 feet? But we are told, that when the delivery cock was stopped, the quicksilver rose, "some little time afterwards, to the second cock, 13 feet 9 inches above the level," and that a small portion of the quicksilver was drawn off at this cock, and then, that it reached 14 feet 4 inches above the level.

From this then it appears, that a column of quicksilver was raised to the height of 14 feet 4 inches, but we are left completely in the dark as to the capacity of the boiler; and therefore, the whole might have been accomplished by an apparatus similar in principle to the common thermometer. Surely, Mr. Bernhard and

his friends are either fully aware of the imperfections of the apparatus, or are determined to keep the public ignorant of its advantages.

IMPROVEMENTS IN INTERNAL STEAM NAVIGATION.

THE great improvements which have been recently made in the conveyance of passengers and goods upon railways, and particularly the high speeds attained in that mode of conveyance, have induced canal proprietors in different parts of the kingdom to endeavour to effect such improvements in internal navigation as may enable them successfully to compete with the rival means of conveyance. With this view a number of experiments have been made on the Forth and Clyde canal, to ascertain the practicability of moving boats at considerably higher rates of velocity than had been previously considered attainable in the narrow rivers or canals. These experiments (*see our last volume, page* 122,) exhibited some very important results, exceedingly at variance with received notions on the subject of navigation. For instance, it was ascertained, that, when the velocity of a boat approached nine miles an hour, the heavy surge, which ordinarily precedes and follows a boat moving in a narrow canal, and which in many cases is so destructive to the banks, that this surge entirely ceased; and, at the same time that the power required for moving the boat, instead of increasing as the square of the velocity, was very little more at nine miles than at seven.

In consequence of these results (which are fully detailed in a work just published by Mr. Fairbairn on the subject), the proprietors of the Forth and Clyde canal resolved to try the effect of steam navigation on their canal, and, with this view, ordered two steam boats to be constructed by Messrs. Fairbairn and Lillie, of Manchester,—one intended as a packet-boat and the other for the conveyance of merchandize. The former of these was launched on the river Irwell last week, and some trials were made of her powers on Wednesday, Friday, and Saturday,—of which trials the following particulars have been communicated to us by one of the parties interested in their result:—

The twin passage boat, *Lord Dundas*, built for the Forth and Clyde Canal Company, by Messrs. Fairbairn and Lillie, of this town, was launched last week on the Irwell for trial, previous to being sent to Scotland. The dimensions of this boat are as follows:—Whole length, 68 feet; breadth, 11 feet six inches; depth, four feet six inches; width of tunnel or wheel trough, three feet ten inches; diameter of paddle wheel, eight feet six inches; and propelled by an engine, on the locomotive principle, of ten horses' power.

The entire weight of the hull of the boat is under two tons

fifteen hundred weight, while the weight of the boiler (which, for security, was made nearly double the strength of those used in similar engines on the railway), with the engine, wheel, fittings, water in boiler, &c., is upwards of six tons; making a total weight of from nine to ten tons.

When floating without the engine and machinery, the average draught of water was eight and a half inches: with the boiler filled, and her engine, coals, and machinery, the average draught was increased to nineteen inches and a half: but unluckily, from the machinery being placed a little too far forward, she hung about five inches by the head. Notwithstanding this great disadvantage, the *Lord Dundas* was propelled at the rate of six miles and a quarter through the water. To remedy in part, this defect, the float plates of the paddle wheel were drawn in nearer the centre, thereby reducing the diameter from eight feet six inches to seven feet six inches: two tons of coal and coke were placed near the stern for the purpose of trimming: her speed was then increased upwards of a mile and a half, or within a fraction of of eight miles per hour.

During no part of these trials was the engine of the *Lord Dundas* working at one half her power, from a deficient supply of steam, occasioned by a want of draft under the boiler, which, however, can be easily rectified. When this is done, and the paddle wheel increased to its original diameter, and some slight alteration effected so as to give her engine full power, there is no doubt but the *Lord Dundas* will realize the intention of the builders, and fully answer the purpose for which she was intended by the Forth and Clyde canal company.

All new undertakings of this description are surrounded with difficulties, and many unforeseen obstacles will present themselves which can only be demonstrated by experiment. The first trial with the *Lord Dundas*, however, gave every satisfaction, as she sailed through the narrowest parts of the cuts, on the line of the Mersey and Irwell navigation, at a rate of seven miles an hour, without any sensible surge, or the least wash on the banks; in fact, the *Lord Dundas* is admirably calculated for navigating canals, as the whole action of the paddle wheel is in the middle or deep part of the canal, and the water is perfectly free from agitation at the banks on either side.

In one particular, and that of the greatest importance, the *Lord Dundas* exceeds all expectations: she has little or none of that tremulous motion so common to all other steam boats; and there is not the least noise except what is occasioned by the discharge of the steam into the chimney, and this, it is expected, will not be heard by the passengers in the cabins when her fittings are completed.

Another remarkable feature in this boat is the great economy in the consumption of fuel: during a period of six hours and upwards constant work on Saturday, the whole quantity of coal

and coke consumed by the *Lord Dundas* did not amount to eight cwts. and coal was found to answer better than coke.

In the course of eight or ten days, when the proposed alterations are effected, the *Lord Dundas* will again make a few experimental voyages on the Irwell and the canal; when it is expected she will perform the full amount of her required speed, and fully realize the expectations of the projectors, by a force that will send her through the water at a rate of nine to ten miles an hour.—*Manchester Gaurdian.*

STABILITY OF CHAIN BRIDGES.

TO THE EDITOR.

SIR,—The following account of the breaking of a chain bridge deserves some farther notice than the mere account in the newspapers, from which I have extracted it.

A lamentable accident occurred to a party of the 60th rifles corps, consisting of about seventy officers and men, who were returning from exercising on Kersal Moor, by the Broughton road, to their quarters in Regent Road barracks. At noon the party reached the Chain Bridge at Broughton, and commenced filing across it. Scarcely had the leading file, preceded by three of their officers, reached *terra firma* on the Pendleton side, when a tremendous noise, resembling an irregular volley of musquetry, arrested the attention of the party. In an instant after the bridge separated at the end next the toll-house, and, with a large quantity of the stone pier, was precipitated into the river. The situation of the soldiers at this moment was frightful; about 40 of the party, encumbered with their arms and accoutrements, were entangled with the railing of the bridge, or overwhelmed in the river. Most providentially the river was low, and thus no lives were lost. But we are concerned to state, that six are now in the hospital with fractured limbs, some of whom it is feared, will be disabled for life, and fourteen others have been injured more or less, by cuts, contusions, &c.

By this account, though couched in very vague terms, we are enabled to discover, that the actual weight on the bridge at the time it gave way, could not, allowing 140lbs. for the weight of each man and his accoutrements, have exceeded *five tons*, and that this weight must have been distributed over a considerable portion of the bridge. Now as the leading file, with three officers, had left the bridge before the accident, it is quite evident that the bridge did not break at the instant when it had to support the greatest quantity of weight, and that therefore it is not to the weight alone which we must look for the cause of a fracture, which took place under a less pressure than the bridge had immediately before sustained. From these considerations it may be

inferred, that the vibration communicated to the chains composing the bridge, by the regularity of the soldiers' march, must have produced the mischief. The vibration once commenced, must have been augmented by every step of the men, till the mass had acquired a momentum too great for its strength.

Over the same bridge a much greater number of persons might have passed at the same time in perfect safety, provided they had gone in a crowd, or an irregular manner, or double the weight of cattle might have crossed without danger, as in both these cases the tendency to vibration in the bridge would have been immediately counteracted by the diversity of motions communicated.

In confirmation of this position I may mention, that I have observed the chain bridge at Hammersmith put in a state of much greater vibration by a light one-horse chaise with one person in it, than by a carriage drawn at the same speed by two horses, with three persons inside, besides a coachman and a footman outside. These considerations should act as

A CAUTION TO TOLL KEEPERS OF CHAIN BRIDGES,

to prevent the passage of any thing under circumstances calculated to put the bridge in active vibration; for it is evident, that as the weight of the bridge itself must greatly exceed any weight put upon it, the greatest care ought to be taken to keep the immense mass of metal composing the bridge, in a quiescent state.

With this view the gate keeper should not, under any circumstances, permit a party of soldiers to march in order, or a single horse, whether used in riding or in a chaise, to pass at an uniform rapid rate the whole length of the bridge.

I am, Sir,

Your obedient Servant,

ROBERT CHRISTIE.

29, *Southampton Buildings, London.*
April 22, 1831.

OIL EXPRESSED FROM COTTON SEED.

Some account of the Oil expressed from Cotton Seed; extracted from a letter addressed by Gen. D. R. WILLIAMS, *of South Carolina, to* Messrs. FOLLET & SMITH, *of Petersburg, Virginia.*

WE have previously given some account of the patent obtained by Mr. Francis Follet, for a machine for hulling cotton seed, and also of some improvements subsequently made in that machine by himself and Mr. Jabez Smith. The object of hulling is to get rid, not merely of the hull, but of the fibres of cotton which adhere to it, and which would absorb and retain a large portion of the oil, under the press. When it is known that the seed weighs about three times as much as the cotton which surrounds it, an estimate may readily be made of the immense produce of this article in the southern states.

Not long since, those who had cotton gins, felt themselves obliged by any neighbour who was willing to take the seed away, and what might have produced *millions* of dollars, has been rejected as of no value. We sincerely hope that Mr. Follet may at length be remunerated for the series of sacrifices, and the indefatigable exertions which we are aware he has made, and that he may have the gratification of knowing that he has become the founder of a manufacture of great national importance. Of this gentlemen we have no personal knowledge, but are sufficiently acquainted with the history of his machine, and so well convinced of its real value, as to feel a high degree of interest in the general introduction of the one, to the great benefit of the other.—*Franklin Journal.*

Society Hill, 13th May, 1830.

Gentlemen—Your favour reached me in due course of the mail. I have not replied earlier, because as our oil mill was so nearly finished, I preferred to delay the acknowledgment, till I could speak from facts, resulting from my own experiments; and although these have not been carried out as far as I propose, they are quite enough so to satisfy my own mind fully. In relation to your "cotton seed huller," I am gratified to be able to say, it performs all that you have promised for it, and is, moreover, most easily comprehended; ours has been set up and put into operation by persons who never saw one before. Our oil mill is after the Dutch mode, of pestle and wedge. Our grinding stones are not quite four feet in diameter, and 12 inches thick. The cotton seed kernels are so much easier to grind than flax seed, these stones, small as they are, may easily grind for two pair of pestles and wedges. That the whole process is simple and not difficult to understand, you will infer, when I tell you, that no person concerned about ours, except myself, has ever seen an oil mill before. You are aware that I attempted last winter to enlist the public generally in favour of your invention, by a few pieces in the Columbia Telescope, signed "a Cotton Planter." These were founded on information, with which I had been favoured. You may be certain of the satisfaction I feel in having tested by actual experiment, that all those statements were perfectly correct. In relation to the uses to which cotton seed oil may be applied, it is almost superfluous to include *painting*, as that fact is fully settled: the same process which is indispensable to make flax seed oil dry, produces the same effect with this. There are good judges who pronounce it to have a better body, and to be, therefore, superior: considering to what extent the adulteration of linseed oil has been carried, owing to the decrease of material, it is not hazardous to say the cotton seed oil *ought* to be preferred. Without resorting to any of the patented methods of refining oil, I have succeeded, by a simple and cheap process, in refining ours, so as to answer all the purposes of the best sperm oil, in our cotton factory. Our superintendent, Mr. Hopkins, has been very careful to compare it with as good sperm. oil as I ever saw, and is entirely satisfied of its equality with it. In its present state, we find it burns very well by a little attention to the wick;

by other means than those I have as yet used, I am satisfied it will be much superior to the best animal oil for lamps, it being entirely inodorous, a circumstance of great importance in establishments requiring a great many lights. The residue of the kernels, after the oil is expressed, called oil cake, is excellent for stock generally; particularly for milch cows and pigs. If your invention could do nothing more than to convert cotton seed into wholesome food for stock, it would still be, in my opinion, of infinite importance to the whole southern country. The planter who makes four bags of cotton to the hand, will now, with your aid, have, in addition to his grain, forty bushels of good food also per hand, more valuable than that quantity of oats. In New England it is preferred, pound for pound, to oats. No man is so dull, as not to see that the consequence to his *people* and his *purse*, must be alike agreeable, it being a self-demonstrable proposition, that there is no scarcity, where milk and pigs are abundant.

The only use to which cotton seed was applied previously to the invention of your hulling machine, was for manure. The same quantity fed to stock may, with the ordinary care that every planter is competent to bestow, elaborate ten times the quantity. Thus much for facts: you will not consider me an enthusiast, when I add, I have not the slightest doubt, that the time will come, when, owing primarily to your invention, cotton seed oil will also enter largely into the food of man. From these considerations, I earnestly hope you may receive a very handsome remuneration for your discovery; more you ought not to ask. Do not, like Miller & Whitney, attempt to "kill the goose for the golden egg." A fair price the community will be willing to give, more will produce for you trouble, vexation, and probably defeat. Let me also advise you not to despair of a just reward, because it may be slow to reach you. All communities change their habits slowly; ours is at present prejudiced against inventors. My best days have been spent in attempts to improve the agricultural and mechanic arts; except a few implements of husbandry, I have no reason yet to believe I have in its opinion added any thing to society, but in two instances. I was the first person who attempted the use of mules, certainly in the Southern states, if not in the United States, for the purpose of agriculture. If I had then been as easily laughed out of countenance, as most young men, I should have given it up in despair, for I was ridiculed by old and young. I have lived to see the only limit to their use, is, the circumstances of the planter. I first attempted to dam out the inundations of the Pee Dee, and consequent thereon had well nigh been deprived of a seat in congress, because it was thought, any man who believed "he could keep the fresh from his low grounds, was too big a fool to go to congress." Now there is nearly as much swamp lands reclaimed from freshets in South Carolina, as on the Mississippi. These facts may serve to encourage you, for however slow the community may be in giving its confidence, it does not always refuse it. Respectfully yours,

DAVID R. WILLIAMS.

PLAN FOR SUPPLYING LONDON AND OTHER LARGE CITIES WITH PURE FILTERED WATER,

By Lemuel Welman Wright, Esq. (Civil Engineer,) London.

Having given considerable attention, for several years past, to the important subject of a supply of pure water to the metropolis, with a desire to relieve the public from the disadvantages they now suffer under a supply of acknowledged impurity, the nature of which has been fully discussed and agitated, both in and out of parliament, apparently for the purpose of inducing competent persons to devise effective plans for obtaining a supply in a purer state, and having read with great attention the several Reports of the Commissioners appointed by his late Majesty, and the Committee appointed by the honourable the House of Commons, to inquire into the state of the water supplied to the metropolis and its suburbs, I do not find by such reports that there are any modes pointed out by the various parties who suggested plans for the supply of pure water, which met the views or wishes of either the commissioners or the committee; but the committee state, that after examining the numerous plans and suggestions, they are convinced that it is practicable to supply water by filtration from the Thames, which would be the most efficacious mode of securing the public from the effects of the nauseous and deleterious ingredients with which the supply of that useful and necessary commodity is impregnated.

Great talent has been exerted, and much expense incurred by individuals, to shew that new establishments are requisite, at great expense, to bring water to London from a distance; but even allowing the water were brought from such distance, it would become foul and but little better than the Thames; and the difficulties which occur in any attempt of the kind are to prevent the outlay of more capital than it would be competent to any parties to expend, whether in existence as companies, or to companies hereafter to be formed; to invade as little as possible the tenure of private property, to the injury of its possessors; and to make available the present mains and pipes, as they are now laid down, so as to avoid the necessity of obstructing the pavements, by being compelled to lay down others, at an enormous expense.

It appears by these reports, that the supplies of all the water companies in the metropolis and its suburbs are taken from the river Thames, except the New River Company and the East London, which latter company is supplied from the river Lea, and that a partial supply of the New River Company, during the summer season, is also taken from the Thames, at an establishment formed at Broken Wharf, Upper Thames Street.

The following is an extract from the Report of the Commissioners appointed by his late Majesty, as before stated, on this important subject:—

"To obtain an effectual supply of clear water, free from insects and all suspended matters, we have taken into consideration various

plans for filtering the river water, through beds of sand and other materials; and considering this on many accounts as a very important object, we are glad to find that it is perfectly possible to filter the whole supply, and this within such limits in point of expense as that no serious objection can be urged against the plan on that score, and with such rapidity as not to interfere with the regularity of service."

And in a subsequent part of such report, the commissioners quote Dr. Bostock's opinion, in the following words:—

"It appears, that the water of the Thames, when free from extraneous substances, is in a state of considerable purity, containing only a moderate quantity of saline contents, and those of a kind which cannot be supposed to render it unfit for domestic purposes, or to be injurious to the health; but as it approaches the metropolis, it becomes loaded with a quantity of filth, which renders it disgusting to the senses, and improper to be employed in the preparation of food. The greatest part of this additional matter appears to be only mechanically suspended in it, and separates by mere rest; it requires, however, a considerable length of time to allow of the complete separation; while, on account of its peculiar texture and comminuted state, it is disposed to be again diffused through the water, by a slight degree of agitation, while the gradual accumulation of this matter in the reservoirs, must obviously increase the unpleasant odour and flavour of the water, and promote its tendency to the putrid state.

"Regarding the greatest part of the extraneous matter in the Thames, as mechanically mixed with it, we may conceive that a variety of incidental circumstances will affect its quantity in the same situation, and under the same circumstances of the tide; but the observations are sufficiently uniform to warrant us in concluding that the water is in the purest state at low tide, and the most loaded with extraneous matter at half ebb. It would appear, however, that a considerable part, if not the whole, of this extraneous matter, may be removed by filtration through sand, and still more effectually by a mixture of sand and charcoal."

From a consideration of the above facts, I feel no difficulty in coming to the conclusion, that separate filters may be formed under the bed of the river Thames itself, competent to furnish a quantity of pure water, equal to the consumption of each company, and the conviction that this will be found the most simple method of obtaining a supply of pure water, has led to the following mode of carrying such an object into effect, which it is hoped will appear clear and easy, certain of success, not interfering with the navigation of the Thames, not throwing into disuse the expensive engines, pumping machinery, and supply pipes already in place for use, not too expensive, or otherwise objectionable for existing companies to avail themselves of, and perfectly within the reach (at a moderate outlay) of any new companies, for the supply of pure water, which may be formed hereafter.

The following observations will lead progressively to a develope-

ment of the natural mode of filtering water, and shew how this mode may be adapted to general use, without any of the disadvantages noticed above.

The wells on both sides of the river Thames, within a certain distance, it is well known, are affected by the rise and fall of the tide, which fact proves, that such wells derive a supply by filtration from the river.

I believe it is generally admitted, that these wells give a supply of water wholly untainted with animal or vegetable matter, and only impregnated with mineral or saline matter, where it had passed through earth containing such matter, and evidence was given before the committee, that the water of the Thames when filtered is particularly wholesome, and the wells of water in its neighbourhood being pure, proves the efficacy of the filtration; and it being found that this water does filter through the surrounding soil, at a rate which, although unknown, must be very considerable, (because it affects wells at a distance of many hundred yards,) it must follow that there can be no great difficulty in obtaining a similar supply by means of a filter constructed on the same natural principles, under the bed of the river itself, which may be made of materials not containing mineral matter, that can pass in solution with the water.

The deposit of mud on the sides of the river Thames does not reach beyond the low water mark, and the bed of the river throughout, is generally a clear porous gravel.

The deposit of mud, therefore, will puddle in, and close the pores of the gravelly bed on which it lies, above the low water mark, so that the filtration into the neighbouring wells must take place below low water mark. It is therefore proposed to construct a filtering chamber below the bed of the river, from which a main pipe or tunnel will conduct the filtered water into a well on the river side, which may be taken from thence by the present steam power on shore, and delivered out by the mains and branches now laid down by the existing water companies.

The drawing at plate 4, exhibits this mode of operation, and the means by which it is to be accomplished are as follow :—

Fig. 1, is a vertical section of a portion of the river, shewing the proposed filtering bed, the supply pipe, the well, and the engine house. Fig. 2, is a plan or horizontal representation of the floor of the filtering bed, the conducting pipe and the well. The line *a a*, is the level of the river at high water; the line *b b*, its level at low water; *c*, is the filtering bed, composed of materials as described below; *d*, is the filtering chamber, or receptacle for the water when it has percolated through the bed; *e*, the pipe which conducts the pure water; *f*, the well in which the water rises to the level of the river; *g*, the suction pipe; *h*, the engine house.

A coffer dam must be erected, of a sufficient capacity to enclose the area, estimated as requisite to filter any given quantity of water, and the bed of the river must be dug out, to allow the bed of brick work or stone, set in cement, being laid, and the floor must be constructed as an inverted segment of an arch each way, with a wall

round it about two feet high. On the top of this wall are to be laid plates, and in the enclosed area, the granite blocks are to be set; upon these are to be laid the girders, and over these the joists, placed so as to support a first layer of large flints, upon which smaller flints are to be laid, so as to be secure from falling through. Upon this second layer, another layer of smaller flints is to be placed, and upon that still smaller flints in succession, decreasing the size in each layer as it approaches the surface of the bed of the river, until the bed is prepared, upon which a stratum of fine clean shingle can be securely deposited. Upon this bed of clean shingle a bed of fine and very clean gravel should be strewed, and on that a bed of filtering sand, until arrived within one foot of the level of the bed of the river, which last space should be then filled up with clean gravel, thereby making a filtering bed in depth of - - - 8 feet

To which add, for the wood or iron framing and brick work below - - - -	7 do.
For the rise and fall of the tide - - -	18 do.
Supposing the top of the filtering bed to be below low water mark - - - -	4 do.
Total - - -	37 feet

thereby requiring piles of about 45 feet in length, to make the coffer dam, which must be removed when the work is completed.

The water will percolate through the filtering bed, and the sides of the opening being puddled with clay, it will be found that no water can pass (by filtration or otherwise) into the chamber, without passing through the prepared strata, which will thoroughly clear it of all impurities, while the action of the alternate ebb and flood tide upon the top surface of gravel, on the bed, which is of course level with the bottom of the river, will prevent the possibility of any deposit or accumulation of filth on this newly made part of the river bed; and as any impurities mechanically suspended, will be continually attracted by the shore where it will be deposited in parts, where there is no current, the difference of gravity, and the strength of current being considered, it is evident that the upper or surface part of the filtering bed will always be clean, and in contact with the cleanest and purest water in the river.

And as a further evidence that the bed of the river, under which the filter is made, must be perfectly cleared from deposit, it is quite plain, that where the current over the filter bed is stronger than the progress of the water through the filter, there can be no deposit, which would be the case in this instance; and besides, as a further reason that there can be no deposit which can remain on the upper bed of the filter, the engine which will draw up the water may be required to be worked twelve hours per day, and that only during a part of the tide; and while the engine is not at work, as the water falls in the river, so will the filtered water fall in the reservoir, to find its level, and thereby return upwards through the filter bed; and having been already filtered in its passage down, cannot possibly

leave a deposit in the filtering chamber, and must clear away, of necessity, all impurities on the top of the bed, by disturbing the sediment (if any) that might be on the surface of the filter bed, and which sediment would then be carried away by the current of the ebb tide, from over the upper surface of the filtering bed.

It may here be remarked, that the water in the filtering chamber would not be liable to the influence of either the sun or frost, from its being below the action of both, and the water would be constantly fresh and cool from the river, as the filter would be in operation for supply, only while the steam power is at work.

As the water is filtered, and passes into the chamber, it will be conveyed by the pipe to the well on shore, where it will be completely within reach of pumps worked by steam power, and this communication from the chamber to the well must be made by sinking the well shaft on the shore while the coffer dam is building, and projecting from the well shaft a horizontal tunnel to the coffer dam, into which an entrance is to be made at or near the feet of the piles forming that side of the dam next the shore.

An air pipe, not represented in the drawing, may be made to pass through the supply pipe, and up the well, to carry off any air which may get into the upper part of the filter chamber.

When the filter is completed, and in operation, there will not be any obstruction to the navigation of the river; to all appearance it will be the same as if the filter was not in existence.

AMERICAN PATENTS.

For an Improvement in the Saw Set. HERRICK AIKEN, *Dracut, Middlesex County, Massachusetts, May* 24.

THIS instrument is to set saws by punching. The saw is laid upon a bed of steel, so that its teeth pass under an angular faced punch attached to a lever, and raised by a spiral spring. The punch is struck by a hammer. The saw rests upon the bed, sloping towards the back, so as to raise the teeth, and allow of their being set; this inclination of the bed is regulated by a screw.

For an Improvement in the Steam Engine. CHARLES POTTS, *Philadelphia, Pennsylvania, May* 31.

THE object proposed by the patentee, is to produce greater safety in the steam engine, by insuring a constant and uniform supply of water to the boiler.

A float is to be placed on the end of a lever, within the boiler, in the manner of the ordinary ball cock, the fulcrum of this lever is to pass through a stuffing box, to the outside of the boiler; this it may do below the seat of the safety valve, or in any other convenient position. The short end of this lever, or that without the boiler, is intended to be connected with a valve in the supply pipe, which is to regulate the quantity of water which passes into the boiler. This valve is placed between the condensing tub and

the hot water pump; when the valve is completely open, it is to allow water enough to pass for a full supply of the boiler, at the time of the greatest evaporation. The short end of the lever to which the float is attached, the patentee calls an index, as the angle at which it stands indicates the position of the float, and consequently the height, or depression, of the water in the boiler. A rod connects the index with the supply valve; when the float is at the lowest allowable point, the valve is entirely open, and as the float rises, the valve closes, and the supply is diminished.

The claim is to the arrangement by which the motion of the float is made "to regulate the supply of water to the *hot water pump*, exactly in the ratio of the evaporation from the boiler; and also to its operation as an index and tell-tale."

DR. ALBAN'S METALLIC EXPANDING PISTON.

This piston is so constructed as to give a continuous expanding band, without any excess of wear in the over-lying parts.

Fig. 5, Pl. III. is a side view of the piston; fig. 6 an inside view of one half; *a a* the half which fits on the piston rod *b*; *c c* the other half, having a cavity *d* large enough to receive the bolt-head of the piston-rod; *e e* two opposite segments, each containing one-third of the circumference; consequently, the filling pieces *f*, between which they slide, occupy one-sixth each; *g g* two exactly similar sliding segments in the half *c*; *h h* their filling pieces: they are screwed to the inner portion of the half *c c*, with necks or collets to keep them at the right distance, and by which they can be adjusted very nicely to fit their sliding pieces *e e* and *g g*. The inner portion of *c* and the filling pieces *h h* are quite flush with the segments, so that when the two halves are screwed together, the segments can just move easy. *i i* steel springs, also screwed to the inner portion; these protrude the segments *g g*, and similar springs protrude the other segments *e e*. *j j* four holes through which screws pass, to bind the two halves together, so that the sliding pieces of one lie over the filling pieces of the other. Thus the four segments produce a continuous expanding band of metal, overlapping each other's ends where their pressure against the cylinder is very much reduced, and gradates off to nothing by the wearing; so that their doubling is a decided benefit, by increasing the wear on those parts which otherwise would have been left the least worn, thus equalising their action against the cylinder, and preventing it from being scored; for it should be remarked, that as the cylinder or the segments of the piston wear, the ends of the latter move only as tangents to the original circle, although their middle parts move in the direction of radii; consequently, the extremities of each of the segments begin to go out of use as soon as the wearing commences; and as the wear at these parts is less than at the middle, the doubling or

over-lapping is necessary to keep the cylinder circular, rendering that essential condition of a continuous and equably expanding band *over-lapping*, a decided benefit instead of an evil. But, were a piston divided into three or four segments, instead of two in each half, the cylinder would be most worn by the overlying parts; for the pressure on their ends is not reduced to half of that in the middle of the segment; consequently, the amount of wear from the two ends that overlie is more than from any part of the segment which acts singly. This piston has been proved with a pressure so high, that the heat softened the springs; therefore, that temperature is, of course, the extreme limit of its use.

In the foregoing article (which is abbreviated from Dr. Alban's description in the last volume of the Transactions of the Society of Arts, &c.) the ingenious writer appears to have had in view, the answering of our objections (contained in our 3rd vol. N. S.) to those pistons, whose segments overlie each other (or break joint); and we have much satisfaction in acknowledging, that by the admirable arrangement of only two segments to each circle, the injurious effects upon the cylinder which we alluded to, will be completely obviated.

MISCELLANEOUS.

Power of Horses in drawing.—This power has been so variously estimated by writers on the subject, that the following results of some experiments on an extensive scale, communicated by Mr. Bevan to the Philosophical Magazine, will be found very useful data for calculation.

Mr. Bevan states, "in the period from 1803 to 1809, I had the opportunity of ascertaining correctly the mean force exerted by good horses in drawing a plough; having had the superintendance of the experiments on that head at the various ploughing matches both at Wooburn and Ashridge, under the patronage of the Duke of Bedford and the Earl of Bridgewater. I find among my memoranda the result of eight ploughing matches, at which there were seldom fewer than seven teams as competitors for the various prizes.

	lbs.
The first result is from the mean force of each horse in six teams of two horses each team upon light sandy soil	156
The second result is from seven teams of two horses each team, upon loomy ground near Berkhampstead	164
The third result is from six teams of four horses each team, with old Hertfordshire ploughs	127
The fourth result is from seven teams of four horses each team, upon strong stony land (improved ploughs)	167
The fifth result is from seven teams of four horses each team, upon strong stony land (old Hertfordshire ploughs)	193
The sixth result is from seven teams of two horses each team, upon light loom	177
The seventh result is from five teams of two horses each team, upon light sand land	176

The eighth result is from seven teams of two horses each team, the upon sandy land 160

The mean force exerted by each horse from fifty-two teams, or 144 horses, =163 pounds each horse; and although the speed was not particularly entered, it could not be less than at a rate of of 2½ miles per hour."

"As these experiments were fairly made, and by horses of the common breed used by farmers, and upon ploughs from various counties, the numbers may be considered as a pretty accurate measure of the force actually exerted by horses at the plough, and which they are enabled to do, without injury, for many weeks; but it should be remembered, that if these horses had been put out of their usual walking pace, the result would have been very different. The mean power of the draught horse, deduced from the above-mentioned formula, exceeds the calculated power from the highest formula of Mr. Leslie;" and we may add that of Mr. Tredgold.

MR. GOMPERTZ'S EXPANDING CHUCK,—IMPROVED.

We are informed by Mr. Gompertz that he has made an important improvement in the expanding chuck, described in our 104th Number, first series) by fixing a plate with *a point* in its centre on the face of the chuck, so that on the piece to be held being driven on the point, it will be kept firm; and which without this contrivanee was very insecurely confined.

LIST OF NEW PATENTS SEALED.

DISTILLING.—To T. Brunton, of Park Sqare, Regent's Park, Esq. for an improved apparatus for distilling. Communicated to him by a foreigner. Dated 28th March, 1831.—Specification to be inrolled in Six months.

HORSES.—To T. Colman, of St. Alban's, Training Groom, for an improved roller for horses.—29th March, 1831.—Six months.

DISTILLING.—To A. Ure, M. D. of Finsbury Circus, for an improved apparatus for distilling.—31st March, 1831.—Six months.

HEARTHS.—To J. Wallace, of Leith, Brazier, for an improvement upon the safety hearth for the use of vessels.—31st March, 1831.—Six months.

STEAM.—To J. Slater, of Salford, Bleacher, for improvements in the method of generating steam, applicable as a moving power, &c.—2nd April, 1831.—Six months.

STRETCHING MACHINES.—To S. Moran, of Manchester, Merchant, for an improved stretching machine.—14th April, 1831.—Six months.

STEAM ENGINES.—To T. Brunton, of Park Square, Regent's Park, Esq. for improvement in apparatus, rendering the same applicable to steam engines. Communicated to him by a foreigner.—14th April, 1831.—Six months.

SUGAR.—To T. Brunton, of Park Square, Regent's Park, Esq. for improvement in apparatus for making and refining sugar, &c. Communicated to him by a foreigner.—14th April, 1831.—Six months.

LOCKS.—To W. Rutherford, Jun., of Yed Burgh, Writer and Bank Agent, for a combination or mechanism to be used by itself, or applied to locks and other fastenings, for more effectually protecting property.—14th April, 1831.—Six months.

GRATES.—To Gaunt, of Chapman Street, Islington, Gentleman, and G. F. Eckstein, of Holborn, Stove and Grate Manufacturer, for an improved fire-grate.—14th April, 1831.—Six months.

PATENTS ENROLLED BETWEEN 10TH APRIL, AND 10TH MAY, 1831.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

COMBINING GLASS WITH METALS.—To John Gunby, of George Street, Sand Pits, Birmingham, Artist, a patent for "an improved method of combining glass with metal, metals, or other substances, applicable to various useful and ornamental purposes," was granted on the 11th of February, and the specification was lodged in the Enrolment Office on the 11th of April, 1831.

The purposes of the combination here patented are, the covering of vases, light stands, and similar articles of ornament or use. To the exterior of the metallic vessel to be ornamented are fitted a series of pieces of brass, copper, or other metal, or mixture of metals, so as to constitute an exterior covering. The number of these pieces will necessarily vary with the form of the vessel to be covered. On each of these exterior pieces is applied a piece of thick glass, which is made to fit accurately by heating the two together, according to the processes adopted by the glass benders. The glass is then to be cut and polished outside and inside, according to any required ornamental design; or the inside may be left with the grain, produced by grinding upon it, at pleasure. The glass thus prepared, is to be fixed to the metal by cement made of gold size varnish, if the metal be gilt; or of any other varnish, either coloured or not, according to the effect required. The exterior pieces of metal, with the glass attached, are then to be fastened to the body of the vessel, by means of projecting pins from the exterior passing through the interior for the reception of screwed nuts, or for riveting, or any other mode which may be found most convenient by the manufacturer of the articles.

PRINTING MACHINE.—To David Napier, of Warren Street, Fitzroy Square, in the county of Middlesex, Engineer, a patent for "certain improvements in printing and pressing machinery, with a method of economising power, is also applicable to other purposes," was granted on the 13th of October, 1830, and the specification was lodged in the Enrolment Office on the 13th of April, 1831.

There are four inventions contained in this patent, all having reference to the printing business. The first is a printing ma-

chine, of the kind called a perfecting, or that which prints both sides of the sheet before it is delivered from the machine. There are two forms of type placed on the same traversing stage, so far apart that the distance between them shall be equal to the length of one of the forms. The sheet of paper to be printed is conveyed to the forms by endless filts and guide rollers, in the manner usually adopted in the printing machines manufactured by Cowper and others. On the axes of the two rollers, which give the pressure to the paper while on the type form, are fixed two wheels, with teeth extending only half round, each of which take into racks fixed on the side of the form stage.

The diameter of these wheels are equal, and they are made exactly to correspond with the diameter of the rollers with which they move: they are connected together and made to turn in different directions by means of a band passing over equal pulleys on each, and being so adjusted with respect to each other, that the teethed half of the one shall be upwards while the teethed part of the other is downwards: and thus they will take into their respective racks, and cause the form to traverse backwards and forwards alternately. This arrangement will be better understood by inspecting the diagram, fig. 1, Pl. VI. *a a'* represent the two cylinders which give the impression, with spur wheel teeth on half the circumferences, as shown at *b b'*. These teeth take into the racks *c c*, which being connected with the form stage *d d*, communicate to it reciprocating motion. The sheets of paper to be printed are received alternately from the feeding stages *e f*, and receive the first impression as they pass under the cylinder *a*; whence following the course pointed out by the arrows, they pass around and receive the second, or completing impression, in returning under the cylinder *a'*, and are finally delivered on the receiving board *g*.

The endless felts, tapes, and guide rollers by which the sheets of paper are conducted, are not shown in the drawing, as they do not differ materially from those usually adopted for this purpose. *h i k* and *l* represent a series of pulley by which the inking apparatus is put into operation.

Mr. Napier's second improvement applies to the inking part of the printing machines. It consists of a series of rods, jointed and connected together in the manner of the system of rods which constitute the parallel motion of a steam engine; and these are applied to produce an alternating rectilineal motion to a frame carrying a set of inking rollers. This inking apparatus is sus-

pended from a frame extending over the type forms; and it is equally applicable to printing machines on a large or small scale, whether actuated by steam or any other first mover.

The third improvement consists of a pair of pressure rollers, for the purpose of pressing the sheets of paper after they have been printed, instead of using an hydraulic or screw press, to give to printed paper the required degree of smoothness.

There is little peculiarity in the construction of Mr. Napier's rolling press requiring particular notice; it does not materially differ from the rolling press applied to book-binding a few years ago by Mr. William Burn, of Kirby Street, and which has now nearly superseded (in London at least) the laborious and uncertain processes of beating, formerly practised by book-binders. The rollers of the press patented by Mr. Napier, are placed horizontally with respect to each other, while those of the press introduced by Mr. Burn, occupy with respect to each other, a vertical position.

The fourth invention described in this specification consists, of a plan of equalizing the intermittent power of an alternating action when applied to produce continuous rotatory motion. The power is to be applied by a lever similar to a pump handle, which turns freely on a fixed axis or fulcrum; at one extremity near this axis is a click or pall, which takes into the teeth of a small ratchet wheel attached to the axis of a box containing a coiled spring, with one end fixed to the axis and the other to the circumference of the containing box. To this box is fixed a teethed wheel, which takes into the teeth of a pinion, or the axis or shaft to be put into rotatory motion. And thus the alternating action of the lever, which is only employed in winding up the spring, is rendered efficacious in giving continuous rotatory motion to a pinion or spur wheel, and hence to any system of machinery to which it may be applied.

DRINK.—To Richard Burgess, of Northwick, in the county of Chester, M. D. a patent for "a drink for the cure, prevention, or relief of gout, gravel, and other diseases, which may be applied to other purposes," was granted on the 21st of February, and the specification was lodged in the Enrolment Office on the 20th of April, 1831.

The drink proposed by this patentee to effect all the above desirable objects is *distilled water;* and to all our readers we say as in duty bound, *Now know ye,* that you must not use any dis-

tilled water without the sanction of Dr. Richard Burgess, of Northwick; who has, after much study and labour, discovered that distilled water given as a drink will cure, prevent, or relieve gout, gravel, or other diseases.

PEDOMETER.—To William Payne, of New Bond Street, in the parish of St. George, Hanover Square, Watch and Clock Maker, a patent for "an improved pedometer for the waistcoat pocket, upon a new and very simple construction," was granted on the 15th of February, and the specification was lodged in the Rolls Chapel Office on the 15th of April, 1831.

The pedometer invented and manufactured by the patentee is of the form, and of the usual size of a common watch; it consists of a lever or pendulum, one end of which is weighted or enlayed, and the other supported by a delicate spring, by which arrangement each step of the wearer produces a vibration and moves a ratchet wheel one tooth, and the latter being geared to a train of wheels (similar to those of a common counting machine,) moves indexes or hands over the face of a dial plate on which the number of vibrations or steps are indicated. The patentee also proposes to attach thereto an ordinary watch, in which case, the train of wheels and other parts of the pedometer, would be placed under the dial plate or face of the watch. The latter could not, therefore, be of the modern flat form, although the superior utility of the combined machine might render it desirable.

TANNING.—To Francois Constant Jacquemart, of Leicester Square, in the county of Middlesex, Esq., a patent for "improvements in tanning certain descriptions of skins," was granted on the 20th of October, 1830, and the specification was lodged in in the Enrolment Office on the 20th April, 1831.

The object of this patentee is to introduce a process of tanning which shall be applicable to the skins of small animals, such as hares, rabbits, cats, and sea rats. The process which he proposes does not, however, materially differ from that well known and in use, except that he adds a small quantity of orpiment to the other ingredients employed in tanning: 5 or 6 ounces are mentioned as a proper quantity for a hundred of the small skins.

He commences the process by removing the hair from the skins, first removing the long hairs and afterwards the short; and to facilitate this operation he steeps the skins in water slightly acidulated, using sulphuric acid in very small quantities, or in

the milk of lime; and in either of these the skins are suffered to remain till the matter which fixes the hair to the hide is decomposed. After the hair has been removed, the skins are to be again steeped in water containing a very small proportion of sulphuric acid, in order to raise or thicken them. The tanning is effected by repeated steeping in water, holding in solution tannin made from oak bark or other substance containing the necessary property, adding to the strength of the mixture every time.

The patentee claims simply the processes which he describes, of tanning the skins of small animals, and rendering them useful for boots, shoes, gloves, and other purpose.

THERMOSTAT.—To Andrew Ure, of Burton Cresent, in the county of Middlsex, Doctor of Medicine, a patent for "an apparatus for regulating temperature in vaporization, distillation, and other processes," was granted on the 20th of October, 1830, and the specification was lodged in the Enrolment Office on the 20th of April, 1831.

The instrument which this patentee has invented, and very properly denominated a *thermostat*, is intended to regulate the size of the apertures through which the means of increasing or diminishing the temperature of any vessel or apartment is admitted. The principle of its action will be readily understood by reference to fig. 4, Pl. V., where $a\ b$ represent a compound bar composed of two flat pieces of metal possessing different powers of expansibility by the same increase of temperature, such as iron and zinc, firmly riveted together. Now suppose the most expansible metal, the zinc, placed on the upper side, the compound bar will bend downwards to the position represented by $a\ b'$; and by diminution of the temperature below that at which the metals were riveted together, a flexure in the contrary direction would take place; and thus a motion is obtained from any change of temperature, which may be made through the medium of levers available in checking the cause of change by altering the size of the opening through which the change was effected. Let c represent a stop cock, through which steam, hot water, or other fluid enters to communicate heat to the vessel containing the thermostat $a\ b$, and let $c\ d$ be a lever or handle by which the cock is turned, joined to the compound bar by the connecting rod $d\ b$: also let the plug or the cock be so adjusted, that it shall be partially open when the lever is in the position represented by $c\ d$, and less open when in the position shown by $c\ d'$; then it is evident, that any increase of

temperature beyond that to which the instrument may have been adjusted would, by causing the instrument to bend downwards, immediately diminish the passage, and consequently, the supply of steam, hot water, or whatever fluid may be used for communicating heat. While on the contrary, a diminution in the temperature would cause the bar to bend upwards, and thus increase the passage for the admission of a greater quantity of the heating vapour or fluid.

The patentee gives a variety of examples of the application of his thermostat for regulating the admission of heating fluids, as well as for regulating the ventilation of rooms, public buildings, &c., some of them displaying considerable ingenuity; but they all depend upon the principle above explained, and therefore we have not deemed it necessary to describe them.

GAS METER.—To Samuel Clegg, of No. 16, Sidmouth Street, Gray's Inn Lane, in the county of Middlesex, Civil Engineer, a patent for "an improved gas meter," was granted on the 20th of October, 1830, and the specification was lodged in the Enrolment Office, on the 19th of April, 1831.

Of all the improvements which have been added to the gas-light apparatus (says Mr. Peckston, in his work on this subject), there is not one of greater importance to the manufacturer than the gas meter. If used between the purifying vessels and gas-holders, it measures and registers the quantity of gas fit for use which may be generated; if between the gas-holder and street mains, the quantity of gas supplied for use from the station is ascertained; and if constructed on a smaller scale and fixed in the houses of the respective consumers, it points out the number of cubic feet of gas that each may have burnt in any given time.

So far back as 1816, Mr. Clegg obtained a patent for a gas meter on a rotatory principle; it consisted of a cylinder divided into several compartments, revolving on a hollow axis for the admission of the gas into the compartments, half of which were immersed in water, so that as the upper compartments became successively filled with gas, and before the gas could escape from those compartments, the apparatus was forced round by the pressure of the gas within it, as the partitions forming the compartments entered the water in a curvilinear direction; and by a train of wheels constituting a counting machine attached to this revolving apparatus, the number of revolutions, and consequently the quantity of gas passing through the compartments of the meter became known, being registered by an index.—This gas meter, after having

undergone several improvements by Mr. Clegg and others, has been very generally introduced and used of late years; but as it is subject to get out of order by a variation occurring in the quantity of water in which it revolves, arising from evaporation, or an increased deposit of water from the gas, the meter before us has been designed to obviate this objection, and measure the quantity of gas passing through a pipe by a machine more simple in structure and certain in action.

The new meter indicates the quantity of gas passing through it by the rotation of a small pulse glass, made to rotate on an axis fixed in the middle of the tube joining the two bulbs which contains spirits of wine sufficient to fill one of them, and being hermetically sealed after expelling the atmospheric air, the glass contains nothing but spirit and its vapour. The pulse glass being placed vertically with the tube connecting the bulbs, bending in the form of the letter S, and entering them at the sides farthest from the centre of rotation, is caused to rotate by cooling the upper bulb by the issue of cold gas from the main upon it, and heating the under one by means of a solid copper cylinder proceeding from a small gas burner placed under the meter, to within a short distance of the lower bulb. Thus the vapour will be condensed in the upper bulb and increased in the lower, till a sufficient quantity of the spirit is forced from the lower to the upper to overbalance the apparatus and cause the bulbs to change places and an index connected with a train of wheels to count one; the bulb which now contains the spirits being the lower is subjected to the action of the heat, while the bulb which contains the vapour is brought opposite to the aperture through which the cold gas enters. To obviate an objection which at first sight might be made to this apparatus, that the difference of temperature between the interior of the meter and the gas as it enters would vary under different circumstances, Mr. Clegg introduces into the interior of the meter a coiled flat pipe, by which the gas is carried three times round the interior, and thus it is made to partake of the general temperature of the meter before it issues upon the upper bulb, so that the relative temperatures of the upper and lower bulb is made to depend entirely on the quantity of gas passing through the meter, which is surrounded by some non-conducting substance, to prevent the escape of heat.

The quantity of gas consumed by the heating burner below the meter being less than one hundred and twentieth part of the gas passing through, ceases to be a matter of consideration; but

as it is evident that the meter will not act till heat is applied to the copper cylinder under the lower bulb, it becomes necessary to prevent the passage of gas through the meter till the heat is applied, and this is effected by means of an ivory conical valve suspended over the entrance of the egress pipe from the extremity of a lever of the third kind, having its fulcrum or joint on which it turns attached to an iron plate, and a projection very near the fulcrum rests on the end of a rod of zinc, brass, or any other metal which expands by heat in a greater degree than the iron plate on which it acts.

This apparatus being placed in the interior of the box it is evident that the communication of heat will raise the ivory valve by the zinc bar expanding more than the iron plate on which it is placed; and to augment the effect, the lower end of the first bar is placed on the longer end of a lever of the first kind, whose shorter arm is acted upon by the lower end of a similar zinc bar, and this second zinc bar in its turn is acted upon by the expansion of a third bar and a similar lever acting on their upper ends; the lower end of the third lever being fixed to the iron plate.

The principal parts of this meter are represented by figs. 2 and 3, Pl. V., where *a a* represents the pulse glass, supported on its centre of motion *b* by means of a piece of hoop, made in two parts and tied upon the connecting tube; *c* is the short copper cylinder for transmitting heat from the burner *d* to the lower bulb and the interior of the meter; *e f* is a small latch which turns on a pivot at *e* and prevents the pulse glass from turning the wrong way by a notch at *f*, resting on the end of a slight arm *g g g* attached to the axis of motion. When this apparatus is once set in motion by the weight of the spirits in the upper bulb it will acquire a momentum in its descent, which will carry it past the line of gravity below the centre of motion, and in this position it will be retained by the latch, so that it is ready to move whenever the weight of the upper exceeds that of the lower bulb. *h h h* is the coiled flat pipe into which the gas enters from the main, and by which it is carried three times round the interior of the meter, that it may partake of its general temperature before it issues upon the upper bulb by the pipe *i*; *k k* is an exterior casing, made double, to contain some non-conducting material. *l* is the pipe for the escape of the gas from the meter, and *m* is the ivory conical valve suspended from the lever *n*, which is shown complete by fig. 3, where *o* represents the pivot on which it turns; *p* a small projection resting on the end of the bar 1, whose lower

extremity rests on the lever $q\ q$, the short arm of which supports the bar 2. The upper end of this bar receives the pressure of the longer arm of the lever $r\ r$, being transmitted to it by the lengthening of the bar 3. This last bar having its lower extremity fastened to the iron plate transfers its expansion multiplied by the lever r, to the bar 2, which again transfers it, together with its own expansion, magnified by the lever q to the bar 1, which in its turn transfers its expansion, together with that of both the others, all greatly magnified by the lever n, to the ivory valve m, which being adjusted to rest on the aperture of the pipe, prevents the passage of the gas till it is lifted by the expansion of the bars.

AIR AND EVAPORATING STOVE.—To Andrew Ure, of Southampton Row, in the county of Middlesex, Doctor of Medicine, a patent for "an air-stove apparatus for the exhalation of, and condensation of vapours," was granted on the 20th of October, 1830, and the specification was lodged in the Enrolment Office on the 24th of April, 1831.

This invention consists in drawing a stream of air, by an air pump or exhausting apparatus, through a chamber over the surface of any moist substance sufficiently heated to give out vapours, and then condensing the mixture of air and vapour by propelling it through a body of cold water to absorb it. The chamber is directed to be constructed of wood, copper, or other suitable material, and of a rectangular form (as being most convenient), and about twice as long as it is wide. At one end of the chamber, immediately below the roof, is a pipe, through which the vapour exhaled from the substance under operation is extracted; it is connected with the exhauster, which propels the vapour into a cistern, where it is condensed. At the opposite end of the chamber to that where the exhausting pipe is fixed, is a sliding door, which may be opened to admit a stratum of air sufficiently thick, according to the intensity of the heating medium, in order to facilitate the exhalation. The substance to be evaporated may be heated by steam pipes or hot water, contained in a second chamber below the evaporater. This apparatus, it is observed by the patentee, is particularly suited for evaporating raw sugar without injuring their quality: but to obtain the full advantage of the stove it must be kept at an uniform temperature during the processes, by means of the thermostat described in the preceding patent.

SUGAR.—To Andrew Ure, of Burton Cresent, in the county of Middlesex, Doctor of Medicine, a patent for "an improvement or improvements in curing or cleansing raw or coarse sugar," was granted on the 20th of October, 1830, and the specification was lodged in the Enrolment Office on the 20th of April, 1831.

The patentee describes his improvements to consist in the employment of alcohol faintly acidulated, as a solvent to remove the quicklime and glutinous extractive matter with which raw sugar is incorporated.

The proportion of acid specified is one ounce of sulphuric, nitrous, or other powerful acid, to one gallon of alcohol, at forty degrees above proof. The sugar cleared by this mixture will be freed from impurities, so as to admit of its being packed in bags instead of hogsheads for transportation from one country to another.

The specification is concluded by stating the claim to consist of the combination of the alcohol and acids.

VENEER CUTTING.—To Alexander Craig, of Ann Street, St. Bernard's, in the parish of St. Cuthbert's, and county of Mid Lothian, a patent for "certain improvements in machines or machinery for cutting timber into veneers or other useful forms," was granted on the 20th of October, 1830, and the specification was lodged in the Enrolment Office on the 20th of April, 1831.

Mr. Craig proposes to employ a circular saw, which he makes to traverse the whole length of the veneer to be cut while it revolves on its axis in the usual way. It is made to traverse by means of a crank, having a radius equal to half the length of the intended veneer, and a connecting rod, of length sufficient to prevent too much obliquity of action. A uniform tension is preserved on the band which communicates motion to the saw while it approaches to, and recedes from, the source of motion, by carrying the band round a pulley stationed at a small distance beyond the greatest distance of the saw from its driving drum. Though we have mentioned but one saw, there are a series of them attached to the same frame, and put in motion by the same band, which is pressed down by an adjusting pulley between each pair of saws, that it may turn them with more certainty by embracing a larger portion of the circumference of the riggers fixed on their axes. The log of wood from which the veneer is to be cut, is suspended between centres, similar to those of a turning lathe, and made to rotate in contact with the saws; so that it may be cut into one continuous spiral veneer. It is evident, that to

produce an uniform motion in that part of the log in contact with the saws, is necessary to its perfect action; and this the patentee has effected in a very ingenious manner. He puts into slow motion, by a species of gearing known by the name of the endless screw, a shaft, having on its extremity a metallic cylinder, with a surface roughened in a manner similar to the surface of a rasp; and this cylinder being pressed against the circumference of the log, will cause it to revolve at the same speed, whatever be its diameter.

The specification is concluded by a description of an arrangement by which the saws are made to cut beyond their centres, in a stationary log. This is effected by attaching them on axes which do not project beyond the surfaces next the log.

To the frame carrying these saws, a descending, as well as an alternating motion, is given; and the veneer being by a guide plate made to fold back under the saws, it is clear that they will with facility, cut to any required depth without reference to their diameters.

SADDLE CLOTHS and GIRTHS.—To Samuel Clerk, of South Down, Brixham, in the county of Devon, a patent for "certain improvements in making or preparing saddle cloth and girths, for keeping saddles in place on horses and other animals of burthen," was granted on the 20th of October, 1830, and the specification was lodged in the Enrolment Office on the 20th of April, 1831.

A very few words will be sufficient to explain this invention, which is really a disgrace to our pages. It simply consists in introducing into the warp, while manufacturing the saddle cloths and girths, a series of thick cords at small distances from eath other. And these are intended to make indentations in the skin of the horse to which they are to be applied, to prevent the saddle and girths from slipping from their places on which they are fastened.

We should like amazingly, by way of proving the utility of this patented invention, to put this cloth with the ridges over, instead of under the saddle, and then to cause the patentee to ride thirty miles upon it, that he may be fully aware of its effects in preventing him from slipping from his position on the saddle. In conclusion, we cannot do better than recommend this invention to the patronage of our friend Lewis Gompertz, and the Society for the prevention of cruelty to animals.

RUDDERS.—To John Collinge, of Lambeth, in the county of Surrey, Engineer, a patent for "an improvement or improvements on the apparatus used for hanging or suspending the rudders of ships, or vessels of different descriptions," was granted on the 1st of November, 1830, and the specification was lodged in the Petty Bag Office on the 1st of May, 1831.

Instead of supporting the rudder upon the shoulders of the pintles or hinges by which it is connected to the stern post of the ship, the usual practice, Mr. Collinge proposes to support its whole weight upon a ball and socket hinge, situated at the upper extremity of the series of pintles which are employed only to keep the rudder in its place.

This ball and socket support is represented in section, by fig. 3, Pl. V, where *a* shows a steel ball fitting into the gun-metal cup *b*. From the upper side of the ball projects a square dovetailed formed piece, which is cast into the brass or gun-metal top *c*, from which proceeds the double strap *d* for receiving the rudder, to be firmly secured thereto by bolts. A similar double strap *e* proceeds from the cup *b*, to secure that to the stern post. *f* is a passage for the supply of oil to the bearing parts, being introduced at the top, when the plug *g* is unscrewed; and *h* is a receptacle for the waste oil, which is to be removed by unscrewing the plug *i*; *k k* is also a receptacle for oil which reaches this space, and is distributed over the surface of the ball by means of a groove cut round it, in a vertical direction. There is a collar of leather introduced at *l l*, for the purpose of preventing the escape of the oil or the admission of water to the bearing parts.

The advantages proposed to be obtained by this application to ships' rudders, of the hinge long known as Mr. Collinge's ball and socket hinge, is, a considerable diminution of friction, which is obtained first by diminishing the size of the bearing parts, secondly, by supporting the greatest weight where the motion is least, and thirdly, by obtaining a constant supply of oil to the rubbing surfaces.

STEAM BOILER.—To Joseph Gibbs, of Crayford, in the county of Kent, Esq. a patent for "improvements in evaporating fluids, applicable to various purposes," was granted on the 6th of November, 1830, and the specification was lodged in the Enrolment Office on the 6th of May, 1831.

The pages of the Register of Arts, as well as those of many other periodicals devoted to similar purposes, represent steam

boilers manufactured of so many different forms, and flues tortured into so many different directions, that we were but little prepared to meet with much novelty in either case, and we have therefore the greater pleasure in submitting to our readers Mr. Gibbs's steam boiler and flues, which certainly possess one peculiarity of considerable importance. For by the arrangement which he has adopted he is enabled to abstract heat from the gaseous products of the fuel till they are reduced nearly to the temperature of cold water.

The patentee describes several forms of his boiler, but the principle in all is the same, and one example will be sufficient to explain the nature of the invention; which consists, as represented by fig. 4, Pl. V, of an arrangement by which the flue is made to descend in a curvelinear direction through a branch of the boiler, situated below the fire-place, and through which the water is supplied. By this simple means, as the contents of the flue proceed farther from the fire, they pass through a colder portion of water, which will consequently continue to abstract heat from the flue till the temperatures of both are equalized. *a* is a section of a circular boiler, with an interior fire-place *b*, having a descending cylindrical branch *c* supplied with water at the bottom. *d d d* is a flue descending spirally round an air cylinder *e e*, through which the fire is supplied with air, to support the combustion, which may be effected either by exhaustion or compression. When the flue reaches the bottom it passes off, as shown at *f*, into the chimney *g*; *h* is a furnace door, through which the fuel is introduced, and *i* is a temporary flue, for the ready passage of the smoke into the chimney, while getting up the fire, after which it is to be stopped, by the damper or valve *k*. A long cylindrical boiler, placed horizontally, with three descending branches, is also represented in the drawings annexed to the specification, as well as one with the flue passing in a zigzag direction down through the descending part of the boiler.

BEAVER.—To Alexander Bell, of Chapel Place, in the Borough of Southwark, Engineer, a patent for "certain improvements in machinery for removing wool or hair from skins," was granted on the 4th of November, 1830, and the specification was lodged in the Rolls Chapel Office on the 4th of May, 1831.

In the specification of this invention we did not observe any notice of the treatment or removal of wool, as mentioned in the title; but its details were confined, and its sole object appeared

to be, to describe a method of picking out the long hairs from beaver skins, prior to the fine short fur being sheared off, for the purpose of covering hats. Heretofore it has been the custom to employ women and children to pull out these long hairs by hand; and the mechanical means proposed by the patentee for executing the operation, appear to be of great simplicity and effectiveness.

He employs two cylinders of a length greater than the breadth of the skins, and four or five inches in diameter, over the circumference of each of which, in spiral lines, but in contrary directions, is wound a projecting rib, each of these ribs making only one revolution of the cylinder in spirally traversing its entire length. The cylinders are placed so near to each other as to occasion the ribs to come in contact, and press whatever hair or fur passes between them, as represented in the sectional view of them at fig. 6, Pl. VI.; where *a* and *b* shew the two cylinders, with their ribs *c* and *d* in contact taking hold of the long hairs only of the furred skin *e e*, which by machinery not shown is caused to be wound round the projecting bed *f* in the direction of the arrows; and as the cylinders revolve, the hairs are pulled out and drop on the other side. In order that the pressure of the ribs may be somewhat elastic and take better hold of the hairs, they are covered with leather.

The diagram given at fig. 7 will give a more general idea of the leading arrangements of the machine. The rollers *a* and *b*, with their spiral ribs *c* and *d*, are here shown lengthways, revolving in plummer blocks *g g* fixed to a strong wooden frame *h h h*. The power is applied through the medium of a strap and drum *i*, fixed to the axis of the lower cylinder *b*, in which there is a fly wheel *f*. In order that the spiral rib on the upper cylinder may be always kept in contact with that of the lower, a pulley *k* is fixed to the axis of the former, having a catgut band passing round it and a smaller pulley *l*, which is mounted on the axis of a broad leaved fanner *m*, and the resistance which this fanner receives from the air, in its revolution, having a tendency to retard the motion of the upper cylinder, keep its spiral rib gently pressed again to the lower one. *e* shows the skin which passes passes over rollers, and is operated upon entirely on the other side of the cylinders; its tension is preserved by weights, and its motions are produced and regulated by apparatus, which possess nothing of a very novel character, and could not be well explained without reference to other drawings, which we have not space for.

CALICO PRINTING.—To Benjamin Cook, of Birmingham, Brass Founder, a patent for "an improved method of making a neb or nebs, slot or slots, in shells or hollow cylinders of copper, brass, or other metals for printing calicos, muslins, cloths, silks, and other articles," was granted on the 1st November, 1830, and the specification was lodged in the Petty Bag Office on the 1st May, 1831.

The nebs and slots here alluded to, will be best understood by inspecting fig. 2, Plate V., where *a c* represent in section two mandrils for receiving and communicating motion to the exterior cylinders or shell *b d*, with the different designs engraved on their surfaces, for printing calicoes, muslins, &c. It being necessary to change the patterns frequently, while the same connection with the driving machinery is preserved, the shells are made to slip off the mandrils; and in order to secure the shells always in the same position with respect to the mandrils, from the surface of the latter a neb is made accurately to fit into a slot in the former, as represented at *b d*. For manufacturing these nebs and slots out of the solid metal of which the mandril and shell are made, Mr. Cook has obtained his patent. He proposes to cut away the mandril which is made at first larger than the size required, excepting one part which is left to constitute the neb. Then a slot is to be cut in the interior of the shell, exactly to fit the neb, and it is stated that they may either be made co-encentric as *a b*, or eccentric as *c d*.

EVAPORATION—To Joseph Budworth Sharp, of Hampstead, in the county of Middlesex, Esq. and William Fawcett, of Liverpool, in the county palatine of Lancaster, Civil Engineer, a patent for "an improved mode of introducing air into fluids, for the purpose of evaporation," was granted on the 20th of October, 1830, and the specification was lodged in the Enrollment Office on the 20th of April, 1831.

Most of our readers will recollect the notices we have given in our earlier numbers of Mr. W. G. Kneller's apparatus for blowing air into fluids, the arrangement in which consisted of numerous small pipes immersed in the fluid, through which the air was propelled by means of a blowing machine, and this apparatus has, we learn, been successfully brought into use for concentrating syrup in several sugar houses. An account of some comparative experiments of three distinct modes of evaporation were likewise given in our last volume, page 45, by which it

appeared, that the resulting effects were in the following proportions :—

Heat given out by an Argand Lamp.

	Quantity evaporated.
1st. Simple evaporation, unaided by air forced under the liquid	1.375
2nd. Evaporation accelerated by a current of air forced under the liquid.....	1.750
3rd. Evaporation accelerated by mechanical agitation	2"—

Now the invention of the patentees, is, a combination of the last two methods, and the manner in which it is to be performed we shall describe with reference to the illustrative diagram we have given of the apparatus at fig. 2, Pl. V, where *a* represents a section of an ordinary sugar pan, set in a brick furnace *b b*; *c c* a metallic tube, having at its lowest extremity a hollow bulb, from which proceed horizontally two or more tubular arms *d d*, open at their ends for the passage of the air into the liquid; the vertical tube passes through plummer blocks *e f*, in the supporting beams *g h*, and is suspended at its upper end by a cord which passes round the pulleys *i k*, having a counterpoise at *l*, which requires only a little additional force to lift the air tubes out of the evaporating pan, and retain them in that position whenever required. As it is proposed to operate upon a series of pans at one time, by a similar apparatus in each, the pans are placed in a row, and put in motion by the reciprocating action of a long beam, driven by the crank of a steam engine or other first mover. The end of this beam is shown in our drawing at *m*, and on it is fixed (at every pan) a block containing several vertically projecting pins *n*: a short iron bar, having a hole at each end, is put on one of these pins, and the hole at the other end of the bar passes over another of a similar series of pins *o* fixed upon a toothed sector *p*, causing the latter to oscillate in an arc of about 60 degrees, and give an entire revolution (alternately in opposite directions) of a toothed pinion *q*. This toothed pinion is loose upon its tubular axis *c*, but is connected thereto at pleasure by a cluteh box *r*, through the medium of lever rods and handle *s t*. The air enters the tube through holes at *u*, and to relieve the friction on the upper side of the plummer blocks, double metallic bulbs are introduced with washers between them, as shown at *v w*; and for the convenience of connecting and disconnecting the framing of this apparatus, some such means as we have exhibited in our

sketch are resorted to, and in order to connect a series of such frames together, and make them very firm to withstand the powerful vibrations caused by the rectilineal motion of the beam *m*, holes are left at *x* for the convenience of bolting and screwing them up by nuts.

Although Messrs. Sharp & Fawcett obviate, by their arrangement, the necessity of employing a blowing machine, (according to the usual sense of the term) their machinery is not upon the whole more simple than Mr. Kneller's, nor can the friction of the various moving parts be less; neither will less power be required to put their apparatus into action. If it be said, that they have availed themselves of the hint furnished by our notice of the experiments before mentioned, and obtain a great advantage by the *mechanical agitation*, we would observe in reply, that *any degree* of agitation may be produced by Mr. Kneller's mode of blowing air into it; and we question much whether the power required to give a sufficiently rapid alternating motion to the Barker's-mill-apparatus of Messrs. Fawcett & Sharp, in order to form vacuous spaces under the water for the atmospheric air to press into, will not be greater than the power requisite to work Mr. Kneller's blowing machine: in effect they are both blowing machines, and the question of superiority will be determined by the cost of the respective apparatuses, and the power requisite to work them: and as the solution of this question is of importance to sugar refiners, we invite discussion on the subject.

PAINTING BRUSHES.—To Timothy Mason, of No. 56, Great Portland Street, in the county of Middlesex, Brush Maker, a patent for "an improvement in the manufacture of painting-brushes, and other brushes applicable to various purposes," was granted on the 20th of October, 1830, and the specification was lodged in the Enrolment Office, on the 19th April, 1831.

The improvement in the manufacture of painting-brushes proposed by this patentee, consists in making in the end of the brush-handle circular, spiral, or rectilineal grooves, for the reception of the hair to constitute the brush. The hair is then to be tied up in small circular bunches, whose diameter shall coincide with the width of the grooves, and being introduced with the cement usually employed for fastening the hair of brushes, the bunches are severally pressed before the cement is set into an eliptical form, with their shortest diameters towards each other. The grooves in the ends of the handles are to be made in the wood,

or of small metallic hoops or plates, according to the nature of the brushes, and the purposes to which they are intended to be applied.

COAL MINES.—To William Wood, of Summer Hill, in the county of Northumberland, near Newcastle-upon-Tyne, a patent for "the application of a battering-ram, to the purpose of working coal in mines," was granted on the 23d of December, 1830, and the specification was lodged in the Enrolment Office on the 23d April, 1831.

Mr. Wood proposed to effect the detachment of large blocks of coal, by means of a long wedge driven in by a heavy ram, similar to that employed in driving piles. But as the blows are required to be given horizontally, or nearly so, the ram is supported on a rail-way, which guides its direction, so that the whole power of the workmen can be applied in giving momentum to the ram, and consequently effect to the wedge, instead of being wasted in the support and guidance of a heavy hammer. The railway, which is made of two bars of iron, supported on a wooden stage, can be adjusted to any required altitude by three legs or supports, which being hinged to the stage will elevate or depress it at pleasure, by being brought more or less to a vertical position: and the fore leg has a joint about its middle, which will allow of its giving way, instead of breaking by a block of coal falling against it. The stage being adjusted to the position required, the wedge is placed with its small end in a hole drilled in the coal for its reception, and the large end supported on the frame of the ram, in a position to receive the full effect of its blows. To the ram are fixed handles projecting from each side of the stage for two men to work it backwards and forwards, to give its impulses to the wedges.

Whether this invention be regarded by the philanthropist as a means of diminishing a species of human labour of the most pernicious and destructive kind, or by the mechanician as an instance of obtaining a required end by the simplest means, it is equally gratifying to be enabled to lay it before the public.

TUNNELING.—To Sir Thomas Cochrane, Knight, (commonly called Lord Cochrane), of Regent-street, in the county of Middlesex, a patent for "his invented apparatus to facilitate excavating, sinking, and mining," was granted on the 20th of October, 1830, and the specification was lodged in the Enrolment Office on the 20th of April, 1831.

The intention of this patent is to prevent accidents, arising from the breaking in of the superincumbent earth and water, during the excavation of tunnels under the beds of rivers, or in similar situations: and the patentee proposes to effect this desirable object, by introducing into the tunnel two or more air-tight partitions, and then pumping in air into the place where the men are at work, till the pressure within is equal to the pressure without, to constitute a resistance to the tendency of the earth to fall in. The two partitions are placed very near to each other, with a valve or door in each, sufficiently large for the passage of workmen and materials. These being introduced between the partitions, the one door must be shut before the other is opened, that no more of the condensed air may escape by the ingress or egress of a party of workmen, or a quantity of materials, than that which fills the space between the partitions. Into that part of the tunnel containing the condensed air from above the surface of the water or earth, a hollow iron cylinder is introduced, which is filled with water. The lower end of this cylinder is immersed into a well situated in the lowest part of the tunnel. The pressure of the condensed air on the surface of the water in the well, prevents the escape of the water from the cylinder. Through this cylinder are to be supplied the bricks or other building materials, which will readily sink in water without being damaged by it, and these are picked out of the well when they pass the bottom of the iron cylinder.

CUTTING PAPER.—To Lewis Aubrey, of Two Waters, in the county of Herts, Engineer, a patent for "certain improvements in cutting paper," was granted on the 1st November, 1830, and the specification was lodged in the Enrolment Office on the 30th April, 1831.

Since the introduction of the method of making paper by machines in a continuous sheet or web, various plans have been designed for cutting it readily into sheets of the required sizes; and for this purpose is the invention before us. It consists of a cylinder with projecting cutters extending parallely with its axis at distances adjustable to correspond with the dimensions of the sheets of paper into which the web is to be separated. When the paper comes in contact with a projecting cutter, a small revolving cutter is made to traverse along its edge, by which a clipping action is obtained. Other parts of this machine are described in the specification, which not differing mate-

rially from corresponding parts of similar machines already before the public, we have not deemed it necessary to enter upon a lengthened detail of the whole machine on the present occasion.

PRESERVING METALS.—To George Gwinett Bompass, of Fish Ponds, near Bristol, Esq. M. D. a patent for "an improved method of preserving copper and other metals from corrosion or oxidation," was granted on the 4th of November, 1830, and the specification was lodged in the Enrolment Office on the 4th of May, 1831.

The usual way of protecting the copper sheathing of ships from the corrosion produced by the salt water, has been to attach to the sheets of copper pieces of zinc plates, or else by employing a sheathing made of an alloy of copper and zinc, and instead of these Mr. Bompass proposes to protect the copper by the attachment of small plates, made of zinc and some other metals, so that its electricity may be the reverse of that of the copper, and of sufficient intensity to neutralize it. There are various details given in the specification respecting the best method of making the contact of the metals perfect, and other matters of manipulation which we cannot enter upon at present.

PAPER MAKING.—To John Hall, the Younger, of Dartford, in the county of Kent, Engineer, a patent for "a machine upon a new and improved construction, for the manufacture of paper," was granted on the 9th of November, 1830, and the specification was lodged in the Enrolment on the 9th of May, 1831.

In order to collect to the surface of the main cylinder of a paper machine a quantity of pulp sufficient to make paper of any required thickness, Mr. Hall proposes to employ an hydraulic pressure, which he obtains in the following manner:—The cylinder is made to turn in a vessel supplied with pulp on the one side, and clean water on the other, which rises considerable on its exterior, and through the axis which is made hollow for the purpose, and has a bent pipe extending from it to the lowest part. The water is continually pumped from the interior of the cylinder, and thus by the difference in the altitude of the water inside and outside, an hydraulic pressure will be obtained variable at pleasure, and available in causing a greater or less quantity of pulp to adhere to the surface, which is covered with wire gauze supported by strong ribs to admit of the passage of the water from the exterior to the interior.

FIRE-ESCAPE.

[From the Transactions of the Society of Arts.]

The large Silver Isis Medal was voted to Mr. J. BRAIDWOOD, *of Edinburgh, for the invention.*

THE loss of life by fire, although amounting to a very small fraction of the annual mortality, is yet of sufficiently frequent occurrence in London to excite ingenious and humane persons to contrive means and machines for facilitating the escape of those who may be placed in such perilous circumstances, and to justify the Society in devoting a considerable proportion of their time in estimating the relative value of projects for this purpose that are so often offered to their notice. Among the machines rewarded or examined by the Society are so many well calculated to answer the intended purpose, that the difficulty now is to discover any thing of useful novelty or variety in the schemes that are still perpetually crowding on the Society for investigation.

We seem, however, to have arrived at two general principles on this matter: first, that help, to be effectual, must be applied from without, and not by persons whose minds are agitated by the imminent hazard of personal destruction; secondly, that assistance, to be effectual at all, must be immediately applied, and must therefore be made the subject of police or parish regulation, and not trusted to the casual efforts of by-standers.

There are two classes of persons on whom this duty might seem naturally to devolve, namely, the police and the firemen. But the former are so necessary, on such occasions, in keeping order and preventing depredation, that it might be unwise, by making a farther call on their services, to incur the hazard of neglect in both; whereas the firemen are generally collected in sufficient numbers, soon after an alarm is given, to be made available in saving life as well as in extinguishing the fire. But that their willingness and activity may be efficaciously employed, it is necessary that they should have previously become familiar with the management of the apparatus, and have been habituated, by periodical reviews or exercises, to act in a body without confusion. Such an arrangement, however, necessarily implies, that the means of assistance should be attached to and accompany the engines; and when, as in London, the engines belong to several and sometimes rival companies, it might be difficult, without making the matter a branch of general police, to secure the requisite co-operation.

In Edinburgh, the attendance on fires is intrusted to the fire-engine establishment, a particular branch of the police of that city, well disciplined, and possessing an unity of action that cannot exist in London, organized, or rather destitute of organization in this respect, as the metropolis of the empire is. It has been easy, therefore, to combine with the fire-engine establish-

ment a plan for the more efficacious extinction of fire, as well as of saving the lives of those persons who may be unable to escape by their own efforts. The corps is regularly drilled and disciplined, and the apparatus is attached to and forms a part of the common service of the engines, as appears from the following statement in the words of Mr. Braidwood, with whom the plan originated:—

"The apparatus itself is very simple. It consists—

"1st, Of a single chain 80 feet long, 18 ounces to the yard.

"2d, A chain ladder of the same length, having two strong claws, by which it may be hooked to the sill of a window, the sarking or rafters of a roof, or any other fastening, according to circumstances.

"3d, A small pulley with a claw attached, and a cord reeved through it strong enough to bear the weight of the ladder.

"4th, A strong steel cross-bow, with some coils of fine cord, each of which has a bullet of 3oz. weight attached to it.

"5th, A strong canvass bag, capable of containing at least one grown person.

"These articles form part of the equipment of our engines, and always accompany them when called out on an alarm of fire. They are applied to the following purposes:—

"1st, If the fire be in a large building with one staircase, and that staircase so occupied by the inhabitants removing furniture, that the firemen do not find convenient access to carry up their pipes, &c., one man is sent up with a line to a convenient window, from which he drops the end of it, and thus establishes a communication by which hose, &c. are brought up to the required situation, without risk of being burst or injured by persons treading on them when full.

"2d, When the house is one continued line of building, and the staircase of the premises on fire is destroyed, and if some persons be in this way cut off from escape, three firemen are sent to the roof, by going up through the adjoining house, carrying with them the chain ladder, a single chain, and the canvass bag. Having ascended, they immediately fasten the claws of the ladder into the roof, and drop the ladder over the window, where the persons to be rescued shew themselves. Two of the firemen then descend into the window, and putting the persons in danger into the canvass bag, lower them down by the single chain into the street. If it is found that the position thus gained is likely to be of any use in extinguishing the fire, the hose of an engine is drawn up by the men in the window. If on the contrary, there is no advantage to be derived by the men remaining, they are immediately withdrawn, returning either by the roof, or descending directly from the window, as may appear most suitable.

"3d, If no access to the upper part or roof of the house on fire can be had, and if any one be in danger, they are extricated in the following manner:—By means of the cross-bow, a bullet, with a cord attached to it, is shot over the roof, in the manner

suggested by Captain Manby. If the house is not more than three stories high, the bullet may be caught on the opposite side of the house. The chain ladder being thus drawn up, the firemen ascend, and the inmates are lowered down in the bag. But if the house is so high that the bullet cannot be laid hold of on the opposite side, then the persons in danger take hold of the cord, which is guided so as to come within their reach from the window, and by means of it they draw up a small pulley, and hook it on the window sill. The chain ladder is then made fast to the cord of the pulley, and drawn up by those below. When the end of the chain ladder comes to the sill of the window, the persons inside place the claws of the ladder upon it; the firemen then ascend, and proceed as in the former cases.

"The firemen here have been regularly drilled to the use of this apparatus, in the application of which they have become very expert; a good many of them being able to ascend upwards of fifty feet by a single chain, and to descend from a much greater height by the same means. No accident has ever occurred, either in the training or in the actual application.

"Great advantage has arisen from being enabled to carry the hose directly to the most favourable point for attacking the fire; and the men in the inside of a house work with increased confidence, from knowing that their retreat is always secured to them by their getting to a window."

The buckets attached to the fire-engines are made according to a plan presented by J. Robinson, Esq. Secretary to the Royal Society of Edinburgh, and a valued correspondent of the Society of Arts. They are nine inches in diameter, and from thirteen to fourteen inches in depth. They are made of canvass nailed to a wooden bottom, with a ring round the mouth, and a handle of tinned iron. When filled with water, the leakage is very trifling, not amounting to more than one inch in half an hour, and the price is only from four to five shillings; whereas leathern buckets of equal size cost from ten to twelve shillings a-piece, and are, besides, much more liable to be stolen. They are kept in the engine-house suspended, as represented in fig. 8, Pl. VI., not on hooks, but on nails bent rectangularly like tenter-hooks, so that they may be taken down or dislodged by a pole with the least possible loss of time. Their flexibility is also a great assistance in carrying them to the place where they are wanted, as, when pressed into the form, fig. 9, they may be packed into a hand-cart or wheel-barrow with very little loss of space. It is now three years and a half since they were first introduced, and they have continued, from that time to the present, to give entire satisfaction.

Several certificates and signatures of persons considered competent judges are attached to this paper, in testimony of its merits as the most effective fire-escape yet invented.

AMERICAN PATENTS.

Specification of a Patent for a Machine for Lifting Ships or Vessels out of the Water. Granted to WILLIAM BALLARD, *of New York, as assignee of the inventor,* THOMAS EVANS, *of the City of New York, May* 28, 1830.

THE invention above mentioned consists in the application or substitution of cylinders with floating pistons in them in place of screws, or other machinery, in the vertical lift docks now in use. These cylinders with their pistons are constructed in precisely the same manner as what is known and called Brahmah's hydrostatic, or water press, and are applied to the lifting of ships in the following manner, to wit: such a number of piles are driven in the river, as to form two piers, at such distance apart as to allow a ship to be floated in between them; those piles which form the inner row of those piers, are driven at regular distances asunder, and are firmly secured together by large pieces of timber, called plate pieces, running the whole length of the dock, on each side, level or even with the surface or decks of the piers. Between these piles, and from said plates, are suspended a row of cast-iron cylinders, at equal distances apart, and directly opposite each other, on either side of the dock. Each of these cylinders is furnished with a solid iron piston, sliding through a stuffing box in the head of the cylinder; each piston has a cross head, fitted on its upper end, reaching to square posts framed into the plate, half way between the cylinders. These posts form guides for the cross heads, causing them and the piston to which they are connected, to move perpendicularly to the cylinders. From the cross heads iron bars are suspended on either side of each piston, reaching down through the plates to the trussed beams, or girders, which form the cradle for supporting the ship. These bars pass through the ends of the beams aforesaid, and are strongly secured to them by iron keys passed through the bars on the under side of the beams. These beams are made of great strength by a peculiar method of trussing them; they reach the whole width of the dock, two to each pair of cylinders forming a section; a number of sections forming the cradle; the length, breadth, and strength of which will depend on the size of the ship to be lifted. Each section moves independent of the rest, and can be raised or lowered at pleasure. The cylinders are connected together on each side of the dock by a pipe running the whole length thereof. In these pipes, between each cylinder, there is a stop cock, shutting off the communication between them when necessary. One or more pumps are attached to these pipes for the purpose of forcing water into the cylinders for raising the ship. Other stop cocks are provided for letting the water out of the cylinders when the ship is to be lowered.

Operation.—The water being let out of the cylinders by turning the cocks aforesaid, the pistons by their weight settle down in the cylinders, carrying the cradle along with them; and when the pistons

are wholly within, the cradle is sunk low enough beneath the surface of the water to allow the ship to be floated in between the piers, and over the cradle; she being moored in the centre between said piers, her keel is directly over the keel blocks. The pumps being now set at work, the cradle is raised till the sections have all found their bearings, The bilge wedges are now hove up to steady the ship in her position. She his now lifted some distance further, when being safely shored, she is by the continued action of the pumps safely and expeditiously lifted out of the water.

The lowering of the ship is a work of great simplicity; a number of escape cocks on each side of the dock are opened and she descends by her own weight with a steady, constant motion, till she finds her bearing in the water.

Now I wish to be understood that what I claim as new and my invention, is the application of what is called the hydrostatic principle of forcing water into cylinders, after the manner of what is known as Bramah's press; the raising of the pistons by the injection of water into the cylinders in which they are inserted, being applied to lifting the ship in the manner described above. And further, be it known that I do not confine myself to the particular manner of application as described above; that only appearing the most convenient at present.

T. Evans.

Abstract of a specification of a patent for an improvement in the making or manufacturing of what is usually termed Raw Brown Sugar, from the juice of the cane grown or cultivated in the United States, Granted to Wm. A. Archbald, *Sugar Refiner, City of New York, April* 19, 1830.

The improvement in the manufacture of sugar, consists in a mode of cleansing it of its molasses after granulation, and imparting to it a colour desirable for brown sugar, which is to be effected in the following way.

The sugar being sufficiently boiled and cooled to the proper degree of temperature, is transferred into moulds instead of into hogsheads, each mould containing from eighty to a hundred pounds. After it has become sufficiently hard, the moulds are taken into a room of a suitable temperature, generally a little above summer heat, the stoppers are then withdrawn, the sugar pierced, and placed to drain; at the expiration of about twenty-four hours, the cleansing process is commenced in the following manner:—the crust of the sugar is broken, and all the hard part, known by the name of *foot*, dug out; a certain quantity of cane juice, previously boiled to a proper density, and allowed to become perfectly cold, is then poured upon each mould, about a gallon is usually employed; this operation is three times repeated at intervals of about twenty-four hours. The density given to the sirup is about thirty-two degrees of the *pese sirop* of Beaumée; great precision is not required in this particular, and it should vary according as the sugar may have been big

or low boiled. If at the expiration of twelve hours the sirup has not descended into the sugar, the surface should be again broken, and the loose sugar stirred up with the sirup; a small quantity of milk-warm water may also be added, mixing and combining it well with the sirup; the sugar also should be again pierced. At the end of three or four days after the last application of the sirup, one or two of the moulds should be emptied, to ascertain whether the sugar is sufficiently cleansed; if not, the operation must be again repeated upon all the sugar of the same day's boiling. It is then to be left to dry in the moulds until fit for the market.

The sirup which has been employed as above, may afterwards be converted into sugar, either by mixing it with the cane juice, or with the molasses drained from the sugar upon which it has operated, and then converting the mixture into sugar; or it may be converted into sugar alone, as may be found most convenient. In either case it may in its turn be subjected to the cleansing process.

The difference in this process as above described, and such as have been formerly used, is thus stated. The process which the patentee has applied to raw sugar, has hitherto been confined to refined sugar. The refiners invariably employ granulated, and generally white sugar to compose the sirop, which they clarify by the use of expensive materials, and at considerable labour. Great loss is consequent upon the employment of sugar in this way, sometimes to the amount of fifty per cent. as it is diminished in quantity and deteriorated in quality. In the present process, instead of expensive granulated sugar, simple sirup, which has never been made into sugar is used, and suffers no diminution or deterioration. There is a marked difference, therefore, in the two processes, first in the employment of sirup which in only in progress towards the formation of sugar, instead of sugar actually formed; and also in its application to brown, instead of to refined sugar. This consequently is deemed a new application of the process, producing new and valuable results.

The negroes in some of the colonies have been in the practice of pouring what they term *liquor* upon the sugar in hogsheads, but it is notoriously a bad practice, injuring the article, and causing it to be rejected by the grocer. This liquor is generally a thin hot sirup, often poured on in a boiling state, which melts the grain of the sugar, descends but a few inches below the surface, concretes, and forms a dark, solid mass, producing great loss, and should it even drain through, it mixes with the molasses, and is sold as such. The present process varies materially from the foregoing, and depends for its success upon this circumstance; a thick sirup, in a cold state, is applied to the sugar in moulds, it being impossible to operate to the same advantage in hogsheads.

"My improvement consists in cleansing, or improving, what is generally termed raw brown sugar, made from the juice of the cane cultivated in the United States, by employing for that purpose cold sirup made from cane juice, of a density suited to the sugar to which it is applied."

The first specification in this series explains the method of purifying and preparing the cane juice; and the second relates to the wooden vessels, &c. employed in concentrating it.

Remarks by the Editor.—We have condensed the foregoing specification into less than half the compass which it originally occupied, (as well as the other two specifications of Mr. Archbald in our preceding numbers), and having done this without omitting any thing necessary to a full exposition of the views of the patentee, we apprehend that our readers will not complain.

The culture of the cane, and the manufacture of sugar, have become objects of great national importance, and are rapidly extending. The cane has been planted as far north as South Carolina, and that with considerable success. The whole business, however, is a new one in the United States, and we have determined, therefore, to publish such information upon the subject as may appear to us likely to do good; and particularly those processes for which patents have been obtained either at home or abroad. In carrying this intention into effect, we shall be careful not to devote an undue portion of our Journal to this particular inquiry, to the exclusion of that variety which is an essential feature of such a work.

In our selection of English patents, we are frequently governed by their similarity to such as are obtained here, although we have rarely thought it adviseable, or necessary, to particularize the instances, but have left them to speak for themselves.—*Frank. Jour.*

FRENCH PATENTS.

French patent granted to M. Derepas, *of Paris, for a peculiar composition of Phosphorus Match Lights.*

Into a large flask heated in a sand bath, put eight parts of pure phosphorus, which you are to half melt, without allowing it to oxidize. After it is dissolved, add four equal parts of magnesia; mix the whole for an hour at the heat of 90 degrees of Réaumer (=234.5 F.) and moderate the fire in proportion as the operation is terminated. When cooled to from 30° to 33° (=99°.5 to 106.25,) this composition forms a sort of fat powder, which is put into bottles, and when cold, carefully stopped. This substance forms an opaque body fit for inflaming a common match.

French patent granted to Messrs. Michaud Labonte *and* Depuis, *of Paris, for the invention of a method of Plating Copper (cuivre) with Platina.*

Take 123 grammes (= 1899.6 grains) of fine silver, which you are to prepare for solution by the addition of 490 grammes (=7567.6) E. grains) of nitric acid at 42° (= 1.50 specific gravity, at 55° F.:

introduce them into a matrass, and expose it on a sand bath over a continued fire, till the silver is perfectly dissolved.

Afterward prepare in a porcelain capsule, 490 grammes of white tartar, and the same quantity of marine salt. When these substances have been pulverized together, pour the solution into the capsule and stir the whole with a wooden spatula, till a perfect mixture is obtained. This composition is used for preparing the copper intended to be plated: for this purpose, the copper is first cleaned, and this composition is afterwards applied to it to whiten it. This application being made, with the assistance of a flat and very clean piece of cork, upon the metal, the latter is afterwards enveloped by a leaf of virgin silver, and exposed to the action of a well closed air furnace. Let it heat to a degree above cherry red. Apply, by means of a burnisher, and rub on the plate without taking it out of the furnace, and this will apply the substance on the copper-plate. When the whole forms only one body, pass it between laminating rollers, to give it the consistency of a solid body. This first operation terminated, the leaf of platina is prepared of the proper size for the copper-plate intended to be covered, so as to envelope it, and both are cleaned with sand, to remove any grease they may have on them, and dried with clean linen, that there may be no moisture remaining. The copper is then enveloped by the platina foil, in the same manner as was before enveloped by the leaf of virgin silver, and submitted to the action of the same furnace as before, rubbing also in the same way with the burnisher, which applies the platina.

BLOWPIPE SIMPLIFIED.

A MODIFICATION of the blowpipe has been contrived by M. Dangers, and is described in the Bulletin d' Encouragement, which has simplicity and cheapness to recommend it. A wooden clamp, with a screw underneath to attach it to the edge of a table, has a hole bored vertically through it in front, and to this hole underneath is attached a tube, to the other end of which a bladder is tied. Another tube, which terminates with a jet piece, is attached to the whole above. It is obvious that if this bladder be inflated, and its sides pressed together by the knees of the operator, or by any other means, a stream of air will issue through the jet, and maintain the flame of the lamp. To keep up the supply of air, a mouth tube is inserted into a lateral opening in front of the clamp, and which reaches upwards to a convenient height for the mouth. By blowing into this tube occasionally, the supply of air in the bladder is preserved, and to prevent its return, a valve is placed at the end of the mouth tube. This valve is simply a piece of cork, fashioned to a conical opening in a tin or brass piece adjusted to the end of the tube. A short wire, fastened to the cork, passes freely through a little guide, and is provided with a catch to keep it just within the conical opening. The mouth tube may consist of two pieces, one sliding into the

other, so as to be readily adjusted to any convenient length. The lamp should be covered, when in action, with a hood having two openings, one in front for the admission of the blowpipe, and the other opposite for the exit of the jet of flame. The air may be forced out of the bladder mechanically, by surrounding it with a coarse net of twine, and hanging a weight to the bottom of it. This blowpipe unites great simplicity to cheapness and facility of adjustment.—*Bib. Univ. and Silliman's Journal.*

MISCELLANEOUS.

Stiffness and Strength of Timber.—In a series of experiments undertaken by Lieutenant T. S. Brown, to ascertain the relative stiffness and strength of different kinds of pine used in building, it was found that the ratios of the stiffness of white pine, spruce, and southern pine, were as the numbers 1, 1·111 and 1·807. When the weights producing the flexure were increased, it was found that the failures of the wood began at the top. The upper fibres, for rather less than half the depth of the beam, were gradually crushed and broken off in the bending of the specimen; and at last, when no more weight could be supported, a fracture suddenly took place, the lower fibres being drawn asunder.—*Silliman's Journ.*

Power of Carbon to destroy the Bitterness of certain Bodies.—M. Duburga observed that charcoal destroyed the bitterness of a tincture of gentian root, whilst it had no action on that of the centaury; in consequence of which observation, Dr. Kopff made many experiments on different bitter substances, and found great varieties of action. Each experiment was made with two ounces of distilled water, twenty grains of bitter extract of the particular plant, and about sixty grains of the recently-pulverized charcoal; they were digested at temperatures from 78° to 86° F., and examined at intervals, being compared with similar solutions without the charcoal. Wormwood, centaury, gentian, quassia, were not changed; orange-peel, camomile, yarrow, soapwort, and Iceland moss, lost all their bitterness. Endive, rhubarb, &c., &c., were nearly deprived of their bitterness.

When animal charcoal, freed from phosphate of lime, &c., by digestion in muriatic acid, was used in place of vegetable charcoal, similar results were obtained.—*Quarterly Journ.*

A new Metal, Vanadium, associated with Iron.—This new metal, which has an interest far beyond that of many new substances, because it is connected with the physical and valuable properties of iron, was discovered by M. Sefstrom, and has been briefly described in a letter from M. Berzelius to M. Dulong, from which the following is an extract:—

M. Sefstrom, director of the School of Mines at Fahlun, whilst engaged in examining a variety of iron remarkable for its extreme

softness, observed the presence of a substance, the properties of which differed from those of all other known bodies, but its quantity was so small as would have rendered it tedious and expensive to collect sufficient for a correct examination of its properties. This iron was from the mine of Taberg in Smoland: the ore merely contained traces of the substance. Finding that the pig iron contained far more of this principle than the wrought iron, M. Sefstrom thought that the scoriæ formed during the conversion of the pig iron into wrought metal might be a more abundant source,—a conjecture confirmed by experience; so that sufficient having been procured, he went to M. Berzelius during the Christmas holidays, to complete its examination. For the present the substance is called *Vanadium*, after a Scandinavian divinity.

Vanadium combines with oxygen to form an oxide and an acid. The acid is red, pulverulent, fusible, and on solidifying becomes crystalline. It is slightly soluble in water, reddens litmus, and forms yellow neutral salts and orange bisalts. Its combinations with acids or bases has the singular property of suddenly losing their colour—they resume it only on becoming solid again, and being then redissolved, preserve their colour. This phenomenon appears to have some analogy with the two states of phosphoric acid and of phosphates.

Hydrogen, at a white heat, reduces vanadic acid, leaving a coherent mass, having a feeble metallic lustre, and being a good conductor of electricity, but it is not certain that the reduction is complete. Vanadium, thus obtained, does not combine with sulphur when heated to redness, in its vapour. The oxide of vanadium is brown, or nearly black, and dissolves readily in acids. The salts are of a deep brown colour, but, by the addition of a little nitric acid, effervesce and become of a fine blue colour.

Vanadic acid combined with another acid is reduced by sulphuretted hydrogen, and even by nitrous acid, to that blue matter which appears to be a compound of vanadic acid with the oxide of vanadium, analogous to those compounds formed by tungsten, molybdenum, iridium, and osmium. The oxide and acid of this metal together produce other combinations, green, yellow, and red, all soluble in water.

When the oxide of vanadium is produced in the humid way, it is soluble both in water and alkalies. The presence of a salt renders it insoluble, and upon this effect may be founded a process for its preparation.

The vanadates, when dissolved in water, are decomposed by sulphuretted hydrogen, and converted into sulfa salts, of a fine red colour.

The chloride of vanadium is a very volatile, colourless liquid, producing thick red fumes in the air. The fluoride is sometimes colourless, sometimes red, but always fixed. Before the blowpipe vanadium colours fluxes of a fine green colour, in that respect resembling chrome.—*Ann. de Chimie*.

Robiquet on a new Metallic Dye.—A stuff dyed of a clear

bluish-grey colour was taken to M. Robiquet as able to stand the action of every agent without change of tint, a character which M. Robiquet ascertained it to deserve. Concluding that it was metallic, it was also concluded that it must be chloride of silver, from its colour and characters; on boiling the cloth in ammonia, however, no silver, or chloride of silver, was dissolved,—the colour, indeed, became brighter. On incinerating the substance and digesting the ashes in ammonia, and then in nitric acid, both solvents dissolved silver, the first having taken up muriate of silver, and the latter having dissolved the metal.

As it was not likely that any chloride would be decomposed and brought into the metallic state by incineration, it was supposed that the silver had been applied at first as a nitrate and then converted into a chloride; the parts which had penetrated deepest having escaped the converting action. Imitations of the dye were therefore made by dipping the cloth first into solution of nitrate of silver, then drying it, immersing it in a solution of a muriate or of chloride of lime, and immediately upon withdrawing it, exposing it to light; the colour was at once developed, and the success was perfect. By using different strengths of solution of silver, different tints were obtained.

Upon trying the application in a large way, a curious cause of failure occurred. Unless the whole be exposed to the light at once, the colour is not uniform; the parts exposed at different times are dissimilar, and hence cloudiness is produced. This may be obviated in some situations, but not in others, where space is limited.

In printed goods it is supposed that some good applications of this idea may be made.—*Jour. de Pharm.*

Œnometer or Alcohometer.—(*By M. Emilie Tabarie.*)—This instrument is intended to supply the manufacturer with the means of ascertaining the quantity of spirit in any vinous liquid. The principle consists in boiling the wine (for instance) in the open air, allowing the alcohol to escape, and making up the bulk of the residue by the addition of pure water. The difference between the density of this mixture and the original liquid indicates the quantity of alcohol which was present. The apparatus consists of a small boiler heated by a spirit lamp; a horizontal cross bar near the bottom, when left uncovered by the liquid, indicates when the ebullition has proceeded so far as to ensure dissipation of all the alcohol. The densities before and after ebullition are ascertained by a hydrometer with a double scale. For correction of temperature, a thermometer with double scale is used, one scale being the Centigrade, and the other a peculiar division, intended to simplify the operation. Tables accompany the instrument. The whole is intended for the distillers of the centre of France, and costs about forty francs.—*Ann. de Chimie.*

Germination of Seeds at the Surface of Mercury.—Some experiments have been instituted by Professor Mulder to determine the force with which roots are developed. He placed seeds of the

bean and buckwheat in glasses containing mercury, covered over with water, laying them upon the surface of the mercury, and taking care that they were just about to germinate. The very next day the beans had forced their radicles into the mercury; but those of the buckwheat ran along the surface, forming a sort of net-work by their interlacing, and not making the smallest impression upon the mercury. This experiment was instituted on the 26th of September; on the 26th of October he found many of the bean-roots had ramified beneath the mercury, between it and the sides of the glass; but what was especially worthy of remark, in every instance the root was curved back upon itself in the water at its origin. Hence the author concludes, that there is an *internal force* which propels the roots, and which, while it sometimes yields to external circumstances, is never wholly destroyed.

ON THE VELOCITY OF AN ELASTIC FLUID WHICH FLOWS FROM A RESERVOIR INTO A GASOMETER.—In most books of natural philosophy we find the following proposition stated as if it had been founded on data as certain as the pressure of the atmosphere. 'The flowing of an elastic fluid into a vacuum takes place with the velocity due to the height of a column of fluid of the same density with that contained in the vessel, and whose weight would produce the pressure to which the fluid is submitted.' M. Navier has shewn that this could only be true on the supposition, that the density of the fluid in the tube or orifice through which it flows was the same as that in the reservoir, which, from the diminished pressure, is obviously not the case. The results to which he has arrived will for ever banish this false proposition from books of natural philosophy.—*Mem. de la l'Acad. des Sciences.*

LIST OF NEW PATENTS SEALED.

COCKS.—To W. Dixon, of Walsall, Staffordshire, brass-cock founder, for an improvement on the cock or tap applicable to fluids, liquids, and gases. Communicated to him by a person residing abroad.—Dated April 21, 1831.—Specification to be enrolled in six months.

WHEELS.—To G. Stephenson, of Liverpool, civil engineer, for improvements in the mode of constructing wheels for railway carriages.—April 30, 1831. Four months.

DISTILLING.—J. T. Beale, of Church Lane, Whitechapel, engineer, for an improvement in apparatus for separating a portion of aqueous vapour from the vapour of alcohol, in the process of distilling and rectifying spirituous liquors.—April 30, 1831. Six months.

COCKS.—To R. Burton, cooper, of Battersea Fields, Esq., for an improvement on a cock and tap, applicable to fluids, gases, &c. and for its application to other useful purposes.—May 18, 1831.

DISTILLING.—To W. Gutteridge, Clerkenwell, Middlesex, civil engineer, for improvements in apparatus for distilling, and other purposes.—May 18, 1831. Six months.

PATENTS ENROLLED BETWEEN 10TH MAY, AND 10TH JUNE, 1831.

Particularising the Offices in which the Specifications may be inspected with the Dates of Enrolment.

CARRIAGES.—To Thomas Bramley, Gentleman, and Robert Parker, Leiutenant in the Royal Navy, both of Mousley Priory, Surrey, a patent for "certain improvements on loco-motive and other carriages, or other machines, applicable to rail and other roads; which improvements, or part, or parts thereof, are also applicable to moving bodies on water, and working other machinery," was granted on the 4th of November, 1830, and the specification was deposited in the Enrolment Office on the 4th of May, 1831.

The improvements contemplated by these patentees are of three kinds. The first consists of a carriage to be propelled by horses, or similar animals, working a pair of tread-wheels; the second, of a light carriage to be propelled by one or more men, resting with their chests on cushions, and communicating motion to cranks by pushing out their feet, as in the act of swimming; the third consists of an arrangement for preserving the box of the wheel on the end of the axle.

The plan of applying the horse power is shown at fig. 9, Pl. VII., where *a a* represent the tread-wheels; *b* a kind of platform, which is to be folded down to aid the animal in getting upon the tread-wheels; *c* is a connecting wheel for causing the tread-wheels to turn simultaneously in the same direction; *e* and *f* are two spur wheels by which the motion is communicated to the axles of the wheels which support the carriage.

The plan for rendering available the power of man consists of a slight vehicle with three wheels: the fore wheel is furnished with a regulating apparatus for guiding the machine; and on the axle of the hind wheels are two cranks at right angles to each other, to receive alternately the action of the man's feet. The motion is transferred from the paddle boards on which the feet act to the cranks by means of connecting rods. A cushion is provided to support the man who rests upon his chest, that his feet may be at liberty to move the wheels, and his hands to guide the machine.

The proposed improvements in axletrees and their boxes, will be readily understood by inspecting fig. 1, Pl. VIII. where *a a* shows the end of an axle, with an oil cavity *b*, *c c* shows the box for its reception. On the axle is a circular projection or boss *d*,

which fits into the end of the box, enlarged for its reception, and is secured therein by the screwed collar *e e*. This collar is prevented from unscrewing while in use by means of a small side screw; and when the wheel is to be taken off, the side screw is withdrawn, the collar is then to be secured to the axle by means of a key, and then the wheel is to be turned round till the collar is unscrewed.

FURNACES.—To Joel Benedict Nott, of Schenectady, in the State of New York, but now of Bury Street, St. James's, London, Esq. a patent for "certain improvements in the construction of a furnace or furnaces for generating heat; and in the application of heat to various useful purposes," was granted on the 4th of November, 1830, and the specification was lodged in the Enrolment Office, on the 4th of May, 1831.

This invention consists in giving to furnaces a circular or semicular form, that the fresh coals when the fire receives a supply of them, may be, by turning the furnace on pivots by which it is supported, brought into a position with reference to the coals already ignited, that the gaseous products of the fresh coals shall pass through the ignited portion, that the combustible part may be consumed; and thus effect a saving of fuel and the prevention of much of the nuisance arising from the escape of unconsumed smoke. This rotating, or rather vibrating furnace is of course to be provided with an iron casing, to surround the sides of the furnace not intended to be exposed: and it is proposed to make it of a great variety of forms, so as to suit different apartments and be applicable to different purposes; but the patentee does not confine his claim to any of them, and therefore we have not deemed it necessary to detail them at length.

ROTATORY STEAM ENGINE.—To Sir Thomas Cochrane, Knight, (commonly called Lord Cochrane) of Regent's Street, London, a patent for "an improved rotatory engine, to be impelled by steam, and which may be also rendered applicable to other purposes," was granted on the 11th of November, 1830, and the specification was lodged in the Enrolment Office, on the 11th of May, 1831.

The principle of this engine is shown at fig. 1, Pl. VII., where *a a* represent in section an exterior casing or metallic cylinder, turned or bored truly inside and firmly fixed to the stand, which is shown supporting the apparatus; *b b* show an interior cylinder

of smaller diameter, and placed eccentrically with respect to the first. This cylinder is made to revolve with its exterior surface in contact with the interior surface of the first, at its lower side, where a stuffing or packing is introduced to prevent the steam from passing between them at the place of contact, when in action. The cylinder *b b* is divided into two compartments by the vessel *c c*, which extends its whole length, and which is pear-shaped in its section; *d d* is a rectangular piston, furnished with packing at its outer edge, that it may move steam tight against the surface of the exterior cylinder; *e* shows a pipe for the admission of the steam into the interior compartment of the vessel *c c*; thence it is conveyed through the passage *f* and *g* in the piston *d*, and exerting a force on the surface of the piston at *g* impels round the interior cylinder in a direction from right to left. The steam on the other side of the piston after it has performed its work is permitted to escape through the passage *l* and the pipes *k k*, to a condenser, if low pressure steam be employed, or into the atmosphere if high pressure steam be employed. *h h* is a kind of vibrating stuffing box, through which the piston passes, and which being of a circular form, permits the piston to take an oblique position as it revolves.

As the power of this engine depends upon the extent of piston surface beyond the surface of the revolving cylinder, it will evidently have the greatest power when in the position represented, and its power will continually diminish till the piston arrives at the opposite position, when the steam will for an instant cease to exert any effective power; but from this position the power will increase till the piston arrives at its first position, when the power will be again at its maximum. If, therefore, two of these engines were connected together, with the places of contact between the cylinders in the one placed in an opposite direction to that of the other, the power exerted by the steam would be continuous and uniform, and no fly-wheel would be required to regulate the motion.

In the specification of this patent are described several modifications of the invention, but as they all depend on the same principle of action, the example given will be sufficient for the purposes of explanation.

QUARRIES.—To Henry Pratt, of Belston, Staffordshire, Miller, a patent for "certain improvements in the making and manufacturing of quarries applicable to kilns for drying wheat,

malt, and other grain," was granted on the 11th of November 1830, and the specification was lodged in the Enrolment Office on the 11th of May, 1831.

Instead of the usual conical openings terminating in small circular apertures in the flooring of grain kilns, Mr. Pratt proposes to form quarries for the flooring of kilns and other purposes, of cast iron, or baked clay, with oblong slots, or openings, at the tops of rectangular tapering, which he calls, conical channels for the escape of the heated air. He casts his quarries with strengthening bars projecting from their lower sides, and these bars form the sides of the tapering channels, as well as give sufficient strength with a less quantity of material than is required when the quarries are made of an uniform thickness.

ARITHMETIC.—To John Terral, of St. Leonard's, Devonshire, Barrister at Law, a patent for "a method and apparatus of setting sums, for the purpose of teaching some of the rules of arithmetic," was granted on the 13th of November, 1830, and the specification was deposited in the Enrolment Office on the 13th of May, 1831.

The intention of this patent is to facilitate the operation of setting arithmetical questions for the practice of learners, and applicable principally, to examples of simple addition, subtraction, multiplication, and division. The invention consists in a series of figures placed in horizontal lines on a long slip of paper, which is provided with a roller at each end, that it may be wound from one to the other in either direction. Now to make these figures available for the purpose of practising addition, a card is provided with a rectangular space cut out, so as to expose, when placed upon the series of figures, as many of them as it may be desirable to operate upon at one time; then by shifting the paper containing the figures to the right or left, a new set of figures will be exposed; and thus a variety of examples can be set almost instantaneously: and in order to enable the teacher to ascertain, without performing the operation, the correctness of the pupils' work, a series of numbers, as 1, 2, 3, 4, &c. are placed at suitable distances along the top of the paper, and a small square hole is made in the top of each card for the purpose of showing one of the numbers on the top of the paper, that the card may always expose the same figures when the small hole is placed over any given number; and thus is obtained the means of registering answers to all the questions which can be set by the apparatus.

For subtraction, a card is provided which will only expose to

view two lines at a time, and the lower line is made one figure shorter at the left hand end than the upper, that the number it indicates may always be less than the number expressed by the upper line of figures.

For multiplication, there are but two lines exhibited, and the lower, which constitutes the multiplier, may be varied in length at pleasure. And for division there is but one line shown through the card; but a piece of the card is left to cover one of the figures, in order to separate the divisor from the dividend; and upon this separating piece is the mark), and on the card at the right of the dividend is the mark (, or a pair of parentheses turned back to back, with the dividend between them.

For the compound rules are introduced intercepting pieces to separate the pounds from the shillings, and those from the pence, &c.; and upon these pieces are sometimes marked figures to complete and vary the numbers.

In every case, the card used is provided with a hole to place over one of the numbers on the top of the paper, that the answers to the examples may be registered for the use of the teacher.

CHARCOAL.—To William Parker, of Albany Street, Regent's Park, in the county of Middlesex, Gentleman, for "certain improvements in preparing animal charcoal," a patent was granted on the 15th of January, 1831, and the specification was enrolled in the Enrolment Office on the 14th of May, 1831.

The introductory observations to this specification states the object of the patentee to be, the revivification of animal charcoal which has been deprived of its property of clarification or descolaration, by having been already used in refining sugar, so that the charcoal may be employed again for a similar purpose.

The first operation consists in washing the charcoal in suitable vessels from the saccharine and other matters, which it may have absorbed in the refining process; the next is to pass it through a coarse sieve, that will detain any gross substances which may have been accidentally mixed, such as pieces of wood, &c. and afterwards to dry it.

The material thus prepared is now to be put into crucibles, and crammed full; four or five such crucibles are placed one on the top of the other, so that the bottom of the upper serves as covers to the mouths of the under, as represented at *a b c*, in fig. 8, Pl. VII. The upper crucible is, however, provided with

a cover *d*, which is luted, but has a small hole in the centre for the escape of the gas, and the cover is further secured by a bridle piece *e*. The crucibles thus charged, to the number of some hundreds, are to be placed in a large oven, with openings to a furnace underneath, by which they are heated to a bright red colour; and that temperature is continued as long as inflammable gas continues to issue from the crevices or apertures of the crucibles. When the flame from the crucibles cease, the operation is checked by reducing the fire in the furnace, until the crucibles become of a dull red heat; then the oven doors may be opened to cool the crucibles gradually; when cold, they are to be removed, their contents discharged, and ground in a mill or pulverized for use.

Before subjecting the charcoal to ignition, it may be mixed with fresh matter, of the kind from which it was originally produced, such as bones, fat, &c. but the patentee does not consider such additions necessary to the revivification of the clarifying powers of the charcoal.

We do not perceive in what the novelty of this process consists, as the revivification of charcoal by ignition has been practised for a century or more; and we recollect reading in a French work some suggestions for getting rid of the saccharine matter contained in that which had been used in refining sugar, which we think consisted, in decomposing it by fermentation, prior to igniting the charcoal. Mr. Parker's process of *washing* the charcoal, may be original as respects that substance, but it is so commonly applied to others, that *we* should certainly not have advised a patent founded upon such a slender claim. It is indeed to be regretted, that patentees generally avoid consulting the very persons who from the nature of their employment are best able to afford them advice.

SPINNING MACHINES.—To Thomas Sands, of Liverpool, Merchant, a patent for "certain improvements in spinning machines," was granted on the 18th of November, 1830, and the specification was lodged in the Enrolment Office on the 18th of May, 1831.

This invention, which is the communication of a foreigner residing abroad, consists in making a connection between the *whir* or pulley, by which motion is communicated, and the bobbin, that it may be turned independently of the spindle to which the pulley is usually attached. Upon the spindle is fitted loosely a

piece of brass tube which passes through the bobbin, and which rests by means of a circular projection at its lower end on the lifting bar, or rail, which causes by its alternating motion, the distribution of the yarn on the bobbin. The pulley has a projecting inclined ratchet tooth, which fits into corresponding cavities in the lower end of the bobbin for communicating the motion. The flyer is made to partake of the motion by the friction of the brass tube on the spindle on which the flyer is fixed; and to regulate its speed a friction strap of leather is made to act on its lower end, which passes through a hole in the strap furnished with a weight at its other extremity, which being increased or diminished, will be the means of retarding or accelerating the motion of the flyer at pleasure.

This invention is shown at figs. 4 & 5, Pl. VII., where *a* represents the spindle, *b* the bobbin, *c* the *whir* or pulley, *d* the notch in the lower end of the bobbin for the reception of the projecting tooth on the upper side of the pulley, *e* the upper end of the brass tube which receives within it the spindle, and upon it the bobbin, *f* the projection on the lower end of the brass tube which rests on the lifting bar, and which supports the bobbin; *g* is the flyer, *i* is the leather strap for retarding the motion of the spindle by the weight *k*, which is shown in another position by fig. 5.

The application of motion to the bobbin, and thence to the spindle in the manner described, constitutes the claim of the patentee.

CALICO PRINTING.—To Robert Dalglish, Jun. of Glasgow, Calico Printer, a patent for "improvements in machinery or apparatus for printing calicoes and other fabrics," was granted on the 6th of December, 1830, and the specification was deposited in the Enrolment Office on the 6th June, 1831.

The intention of this patentee is to give with facility a greater variety to the patterns and colours than has usually been done in calico printing; and this he proposes to effect by means of a series of belts or bands extending across the piece of fabric, to stop off the colour as the cloth passes through the printing machine, and receives the impressions of the extended patterns, from rollers applied in the usual manner. By varying the size and form of the stopping bands, and afterwards printing the parts which they preserve blank with different colours, the effect may me varied to a very great extent.

The specification of this invention is accompanied by drawings, showing the manner by which the various motions of the printing machine are connected that each part may move at the precise time when its motion is required; but as the above arrangements for stopping out the colours from parts of the fabrics constitutes the principal improvements claimed by the patentee, to them we have confined our notice, which is necessarily limited, for want of more space for illustrative drawings.

GUN LOCK.—To John George Lacey, of Camomile Street, London, Gun Manufacturer, and Samson Davis, of East Smithfield, in the county of Middlesex, Gun Lock Maker, a patent for "a certain improvement or improvements in the construction of guns and fire-arms," was granted on the 6th of December, 1830, and the specification was deposited in the Enrolment Office, on the 6th of June, 1831.

Instead of the percussion hammer usually employed in gun locks, these patentees make the hammer and main spring of one piece, bent somewhat into a staple form, one end being perforated in order to be screwed to the lock plate, and the other being enlarged into a hammer of the usual form, with a small projection on one side to rest upon the end of a lever, which retains it in a position ready to be fired, and which is removed by the trigger in the act of firing. By this arrangement the lock is greatly simplified, and we have no doubt, but that the patent locks will be equally efficacious with gun locks of the usual construction.

GRINDING OR CRUSHING SEEDS.—To Henry Blundell, of the town of Kenton upon Hull, in the county of the said town, Merchant, a patent for "improvements in a machine for grinding and crushing seeds and other oleaginous substances, for the purpose of abstracting oil therefrom; and which machine, with certain improvements or alterations, is applicable to other purposes," was granted on the 6th of December, 1830, and the specification was lodged in the Enrolment Office on the 6th of June, 1831.

Mr. Blundell's crushing mill is proposed to be made of metal, and of a conical form, somewhat similar to the small conical mills used in grinding coffee; but with this difference, that this mill is made with a flat portion at the base of the cone, which as well as both the exterior and interior cones, is to be serrated with teeth varying in size, to suit the purpose for which the mill is intended.

The patentee confines his claim to the flat part at the base of

the cones, and to the form of the teeth; which latter claim is somewhat vague, as he describes more than one form in his specification.

SCOURING PAPER, SUBSTITUTE FOR.—To Richard Edwards, of Dewsbury, Yorkshire, Leather and Flock Seller, a patent for "an improvement or a substitute for glass, sand, emery, and other scouring paper, or substances," was granted on the 6th of December, 1830, and the specification was deposited in the Enrolment Office on the 6th of June, 1831.

The quantity of scouring paper required for use in the manufactories, and by families for domestic purposes, is sufficiently large to render any improvement in the manufacture of this article of importance to the public. With this view we have observed with pleasure that it is proposed by Mr. Edwards to substitute a material of more durability than paper, as a base for the cutting or polishing substances. Calico is the intended substitute for the paper, and as this can now be manufactured nearly if not quite as cheap as paper, it is contended, that this will be economical, being a much stronger and more durable, scouring or polishing material than that made of paper, which generally tears to pieces long before the glass, sand, or emery powder is worn off its surface. The cloth is first to be stretched on a kind of frame, and then sized and glued, when the powdered polishing or grinding material is to be spread on its surface as evenly as possible. The unattached powder being then brushed off, the scouring cloth will be ready for use, and is to be applied in the manner usually adopted in the application of scouring paper.

SHIPS, TO REMOVE FROM THE WATER.—To Samuel Brown, of Billiter Square, London, Commander in the Royal Navy, a patent for "certain improvements in the means of drawing up ships and other vessels from the water to land, and for transporting or mooring ships, vessels, and other bodies, on land, from one place to another," was granted on the 6th of December, 1830, and the specification was lodged in the Enrolment Office on the 6th of June, 1831.

This patentee proposes to convey ships and other vessels, with or without their cargoes, to any assigned distance from the water on which they sail, by means of a kind of rail-way, made of stone, giving the preference to granite, because of its strength and durability.

There are three lines of rail-way provided for every vessel, and a kind of cradle is made to suit the form of the vessel's hull so that it may not receive injury when removed from the water. This cradle, which is sunk in the water, that the vessel may sail on to it, is furnished with three strong rails, forming its foundation, and placed at such distances from each other as to correspond with the distances of the lines of stone constituting the rail-way on which it is to be drawn. For the purpose of raising the vessel from the water to the rail-way a series of inclined rails is to be used; but as an inclination in a loaded vessel might in many instances prove injurious, both to the vessel and the cargo, wedge-shaped pieces are introduced between the cradle and the inclined rail-road on which it is to be raised, and the vessel will pass off and leave these wedge-shaped pieces on the rail whenever it has reached the required elevation. To obviate the necessity of turning the vessel round while out of the water it is drawn up sideways, till it is brought upon the level rail-way, placed at right angles with the series of inclined rails by which its elevation is effected. A series of anti-friction rollers is introduced between the cradle and the rail-way, to facilitate the motion of the vessel, and these rollers are connected together with chains, and being without fixed axes they move at only half the rate of the vessel, and therefore must be brought forward and reintroduced in succession under the vessel. This is evidently a good arrangement for the support of heavy weights in motion, as by it the friction at the axes of motion of the rollers is entirely avoided.

STEAM ENGINE AND DISTILLATION.—To William Church, of Haywood House, in the county of Warwick, Esq. a patent for "certain improvements in apparatus applicable to propelling boats, and driving machinery by the agency of steam; parts of which improvements are also applicable to the purposes of evaporation," was granted on the 29th of November, 1830, and the specification was enrolled at the Rolls Chapel Office on the 29th of May, 1831.

The "certain improvements in apparatus applicable to propelling boats, &c." mentioned in the title, are specified to consist, first, in certain mechanical combinations for burning fuel in furnaces; second, in an apparatus for supplying boilers with water; third, in the construction or form of the boiler; fourth, in an improved motive engine; fifth, in apparatus for the recovery of heat, applicable also to the purpose of distillation; all of which

are fully described in the specification, with reference to numerous figures contained in seven sheets of correctly executed drawings.

The arrangements of the *furnace* will be easily comprehended by reference to our diagram, fig.7, Pl. VII., which exhibits a vertical section : *a* is the fuel chamber (circular in its horizontal section) ; *b* a conical tube for supplying fuel to the middle of the furnace ; *c* a pipe connected to a blowing machine leading into an annular and conical chamber *d d*, through which air is forced into the fuel beneath to excite combustion. At *e* there is a doorway for stoking and clearing the fire whenever required ; this is stopped by a brick. At *f* is a closed ash-pit, having a jointed flap for the removal of the ashes : the passage of the air and products of combustion being thus stopped at *e* and *f*, the current is directed horizontally through the tube *g* into another part of the boiler, which we will presently describe with reference to another figure. The furnace chamber *a* is completely surrounded with water, as shown at *h h h*, and is supplied by a kind of revolving cock at *i*. The apparatus alluded to is one of the heads of the invention; but which we have not thought it necessary to draw, as we did not perceive in what respect it differed from former inventions of the kind by other persons. At *j k* there is a pipe to conduct the heated water into the horizontal part of the boiler; of which we have given at fig. 6, a vertical section, where it is received at *l l*, surrounding three fire tubes or horizontal flues, by which it is converted into vapour, and passes up the pipe *m* into the steam chamber *n*, (to which a judiciously arranged safety apparatus is attached, but not shown in our diagram), whence it proceeds to the engine. After having worked the engine, the eduction steam is made to enter by a pipe (not shown by us) into the outer case *o o* of the boiler, and thence into an interior annulus marked *p p* ; at the same time cold air is made to enter at the pipe *q*, and circulating through the annuluses *r r* and *s s*, the caloric from the eduction steam in the adjoining chambers is thereby abstracted ; the air thus heated is then drawn off, and forced by a blowing machine into the pipe *c*, fig. 7 ; by these means the fire is constantly supplied with heated instead of cold air; the heat being *recovered* as expressed in the introductory heads of the specification : and the water reformed by the condensation of the eduction steam in the annuluses *o o* and *p p* is conducted by the pipe *t* into the resevoir of supply.

The product of combustion in the furnace after being propelled

through the tube *g*, into the horizontal part of the boiler, fig. 6 enters first through a long tube marked *u* 1 ; at the end of which is a curved cap which returns the current through *u* 2,, and this, by a like provision, directs it through *u* 3 ; from this last, the heated gases enter into the annulus marked 4, surrounding the main part of the boiler *l* prior to passing off by the chimney flue.

The specification also describes a distinct " apparatus for the recovery of heat," which is in fact an elegant still : it is delineated at fig. 3, Pl. VII. (which although sketched from memory, as all our diagrams are, is a correct resemblance of the original). *a* is a double vessel, the exterior vessel or case containing steam or other medium for vapourizing the wash contained in the still or inner vessel ; from this the vapour passes through the tubes *b* and *c* into the centre of an air refrigeratory *d*, which is of a cylindrical form, produced by a double convolution of two long and very narrow chambers : that shown white in the drawing being for a current of air, and that which is represented as an intermediate darkened space, being for the vapour, which proceeds through its narrow convoluted chamber from the centre to the outside ; the uncondensed vapour being conducted from the enlarged part *e*, by the pipe *f* into a common distiller's worm tub to complete the condensation. The current of air is produced by a blowing machine which impels it through the tube *g* into *h*, thence passing by *i* it takes its convoluted circuit in an opposite direction to that of the vapour, (robbing the latter of its heat throughout its progress) and finally escapes at a high temperature by the central pipe *k* ; thus the heat is " recovered" from the vapour to be employed in any manner which may be desirable.

The improved motive engine referred to, is of the oscillating kind, with the axis of oscillation at the bottom of the cylinder, which is made hollow, and divided in the middle by a partition ; on one side of this partition the steam is received from the boiler, and passes thence into an ordinary steam box with slide-valves at the side of the cylinder ; whence, after operating upon the piston, the eduction steam is discharged into a jacket to the cylinder, which opens into the hollow axis on the opposite side of the partition to that described, and is conducted to the condenser. The piston rod is connected directly to the crank, without an intervening parallel motion, as the varying position of the cylinder adapts itself to the motion of the crank, on the axis of which is the fly wheel. As all the details of this engine cannot be well

explained without reference to drawings, for which we have not space at present, we must refer the reader desirous of more information in this matter, to the specification itself.

FIRE ESCAPE.

By J. Read, Regent Circus, Piccadilly.

The proposed apparatus consists merely of a rope, to the end of which is fastened a loop or cradle of strong broad straps of web, sufficient to contain two or three persons, see Pl. VII. fig. 2. An iron ring, having a perpendicular bar crossing it like the tongue of a buckle, is to be screwed into the lintel over the window within the chamber, the rope being coiled in a serpentine form around the bottom of the ring by passing it through the two divisions made by the bar or tongue. Or a strong hook with a security spring, which the inventor has prepared, may be fixed above the window, and this ring hung upon it at the moment of escape. The rope, which must be twice the length of the height of the window from the ground (which may be rendered incombustible by saturating it in an alkaline solution), being properly passed through the ring, coiled up, and placed in a closet, or any other convenient situation in the room; upon an alarm of fire, or in time of danger, the ring can be hung upon the hook in an instant. To escape from a window, a person has only to throw the rope (which uncoils itself as it falls) into the street, slip the cradle under him, take hold of the rope outside the window, and sliding out, gradually let himself down, by allowing the rope to pass from one hand to the other. So great is the resistance to the passage of the rope in consequence of the friction against the iron ring, that the weight of a person is but little more than sufficient to bring him to the bottom, and may easily be counterbalanced by *one* hand only. If the person be timid and fearful of trusting to himself, any person in the street may lower him, by taking the rope, and letting it slides as he descends; and in this manner children and females may be speedily and safely let down. In the cradle (which in addition to the support for the back, has for greater safety a cross belt fixed to it, that ties in front of the person) a child may be seated by its mother, if no other person be near, who might thus let down all her family, and then descend herself in the manner above described. A small line may be tied to the cradle, by which any one in the street might draw the person escaping out of the flames issuing from the lower windows, or pull him clear of any architectural projections, balconies, &c. that might impede his descent.

NATIONAL REPOSITORY,

CHARING CROSS.

The Fourth Exhibition of this laudable undertaking commenced a month or two ago, but it is only very recently that we had an opportunity of visiting it, which we did with the intention of hastily noticing the improved machines it might contain; our attention was however arrested by such a multiplicity of curious or beautiful works of art, that we were under the necessity of going a second time to the Gallery before we could commence upon the object of our first visit. The subjects do not appear to be quite so numerous as those contained in the previous exhibitions, but the selection is so judicious that there is much more to interest and admire, and scarcely anything for an individual of refined taste or mechanical knowledge to find fault with.

We are aware that an absurd attempt has been made to depreciate this Institution in the public mind, by a periodical writer whose censure we have frequently had occasion to shew, was in effect, though unintentionally, real praise; and whose commendations, especially of mechanical inventors, have generally (if not uniformly) been the forerunners of complete failure. The instances are so numerous that we shall be excused in mentioning but two of the most conspicuous, viz.—the pretty wheel of wheels at the West India Docks, which was to "gain both power and speed," and the "far-famed Novelty," which was to be "the model of all future locomotives," but now lies ingloriously rusting in obscurity. The well-informed portion of the public will, however, without our remarks, know how to estimate this writer's criticisms upon the unrecompensed labours of the patrons and friends of the National Repository; and we have reason to believe, that when this said critic's excursions shall have extended to the present exhibition, he will be enabled to communicate (with the assistance of a draftsman and a mechanic) more useful and interesting information to his readers than they are accustomed to receive through the medium of his journal.

It being our peculiar avocation to give an account of *every* new patented invention and discovery immediately after the specifications have been enrolled in the public Offices in Chancery, it is scarcely possible but that a large portion of the mechanical subjects exhibited in the Gallery of the National Repository, must have already been noticed in our pages; but although it is well "to read, mark, and learn" from our book, it is better, in order "to inwardly digest them," to go and see them in propria personæ, in the National Repository.

The first subject we shall notice is No 1, in the catalogue, and we purpose in this instance, as perhaps in some others, to avail ourselves of the ably written and judicious remarks contained in the catalogue, with such variations as adapt them more to our own views, and with such additions as are necessary to explain them without reference to the originals.

Model of a Patent Suspension Safety Coach. *By* DANIEL STAFFORD, 18, *Thavies Inn, Holborn.*

"No man of mechanical knowledge can look at the preposterously-laden public vehicles which crowd our roads, without speculating on the risk of human life incurred. He will hail with delight every new effort of science to curb the mischiefs which ignorance, spurred by avarice, is hourly provoking.

"The mode of suspension adopted by Mr. Stafford has very decided advantages, and must contribute essentially to the security of carriage travelling. The body of the coach is supported by two uprights which rise from the bed of the carriage over the middle of each axletree. Each of these uprights has at its top a transverse piece, the upper surface of which is curved. On these curved surfaces rest similar cross pieces, curved on their under surfaces, and held in their places by steady pins, and connected, by the intervention of eliptical springs, with the upper part the of body of the coach. The springs here introduced break the concussions as in other spring-mounted vehicles; but the peculiar advantage of the arrangement ingeniously adopted by Mr. Stafford is, that whenever the wheels by any inequalities or construction of the road are thrown upon a plane inclining laterally, the two curved surfaces, on which contact is maintained betwixt the body of the coach and its supporters, roll on each other, and the points of contact are removed towards the side of the rising wheels, by which the vertical line of gravity is preserved nearer than it otherwise would be to the central point within the supporters, in this case the wheels. The body of the coach, being supported on a line considerably above its centre of gravity, has no tendency to" turn over "with the changes of inclination in the position of the wheels, but in all cases, when properly loaded, will maintain" nearly its "perpendicularity, and thus relieve the passengers from a sense of danger, which in many instances leads to groundless alarm, frequently inducing calamitous results."—*Catalogue.*

At Plate VIII, fig. 2, we have given a diagram illustrative of the effect of the above described mode of hanging the coach body. *a* represents the hind axletree, with only one of its wheels on, and the other end of the axle dragging on the ground; *b* is the hind upright, *c* the springs, *d* and *e* the curved pieces, which come into contact at the point *g*, in consequence of the position assumed by their supports *a* and *b*; and although the coach body *f f* will take the inclination represented with respect to the vertical line of gravity *h h*, it cannot possibly overturn, the point of suspension *g* being so far above the centre of gravity; even were the coach moderately loaded at the top, (suppose to half the weight of the passengers or interior load) the inclination of the body would not be sensibly altered, as the point of suspension would then come nearer to the central line of the body, though still far above the centre of gravity, and it would consequently be almost impossible to overturn;—as the *larger weight* would thus, as it were, be suspended on the *short* arm of a

lever, against the *smaller weight* on the *long* arm. Now we can conceive of no shock communicated to the lower part of the carriage that will have a tendency to alter the proportions of these opposing forces, and it must be admitted there is no liability of the upper part of the carriage being accidentally operated upon so as to materially effect the equilibrium.

Our drawing represents an extreme case,—an accidental circumstance, which is usually attended with serious disaster, but which in Mr. Stafford's coach would scarcely be noticed by the passengers. To prove that considerable lateral inclinations of the road did not injure the coach, or inconvenience the passengers, Mr. Stafford has made some very satisfactory experiments at Worcester, Birmingham, and Liverpool. He put on one side of the carriage, wheels of 54 and 32 inches in diameter, and on the other side wheels of only 42 and 20 inches in diameter, and with these great disproportions, and consequent inclination of the framing of the carriage, it was driven rapidly through the streets of Liverpool, not only without accident, but without the knowledge or even the suspicion of the passengers, that they had any disparity in the wheels, until their attention was needlessly aroused to the curious circumstance, by persons in the street calling out "you have broken down"! We are happy to learn that several coaches have been built on Mr. Stafford's plan, who in their structure seems to have given the important points of lightness, elegance, and strength, their due consideration.

Model of a new method of hanging a Ship's Rudder. By Rear Admiral Brooking, *Plymouth.*

The object of the Admiral's invention is to increase the facility of steering a vessel. The lever, technically called the *tiller*, by which the rudder is moved, turns upon the hinge joints (*pintles and braces*) which connect the rudder to the stern post, as its fulcrum; but instead of placing the joints midway between those parts, Admiral Brooking fixes them into the rudder at about one-third of its breadth from the stern post; there is consequently less strain upon the tiller when the rudder is put into operation. This would appear at first, to have a counteracting disadvantage; the reduced breadth of the rudder extending beyond the centre pin would lessen in the same ratio its power to turn the vessel. There is, however, a space left open between the rudder and stern post, through which a powerful current of water passes in a direction that materially assists in turning the vessel, as will be understood on reference to figures 3 and 4 in Pl. VIII.; fig. 3 representing a side elevation, and 4, an end view, or horizontal section. *a* is the stern post; *b* the rudder; *c c* the joints; *d* the centre pin passing through the joints.* In fig. 4 (where similar

* Our sketch does not, we perceive, represent the centre bolt or pin sufficiently extended into the breadth of the rudder.

letters indicate corresponding parts) is better seen the angular form of the connected portions of the rudder and stern post; and the inventor is of opinion that the effect of the current passing between them, will assist in some degree the usual operation of the rudder in turning the vessel. As we suppose that some exact comparative experiments have been made to determine the utility of Admiral Brooking's plan, we shall be obliged by a communication on that subject.

A new Musical Instrument, called "The Royal Seraphine." By J. Green, 33, *Soho Square.*

"It was scarcely to be expected, within a very brief period, that we should have the power of a church organ compressed into an instrument, the dimensions of which do not unfit it to be a piece of ornamental furniture in the cabinet or drawing-room. Yet this is now accomplished in the Seraphine, in the limited size of which, we have the depth and compass of a full-sized organ. The sustained tones, with a power of swell and softening, give to this instrument, so far as those qualities go, all the expressive powers of the organ; and to a great extent, the Seraphine will prove a an effective substitute for that master-instrument of harmonious sounds."

"The simplicity of principle in the Seraphine gives a certainty to its quality in construction and permanency to its tones, when once adjusted; so that it escapes some of the most serious defects of stringed instruments, the quality of which cannot be calculated on before hand by the maker, and which, when made, never remain long in tune. The obvious properties of the Seraphine, in this early stage of its existence, pronounce it to be of permanent value in practical music; and doubtless it has within its capabilities important qualities, which further cultivation will develope."—*Catalogue.*

Willat's Coach Ventilator.

Whoever has travelled in a stage or other coach in inclement weather, must have experienced the inconvenience from the want of a proper mode of ventilation; but we believe a worse result than inconvenience often attends the breathing of the vitiated atmosphere of a close coach: it is, therefore, with pleasure we notice the present attempt to introduce ventilators into them. The gentleman who invented this apparatus gave it to Mr. Willats, whose name is put to our drawing, (fig. 5, Pl. VIII.) to manufacture. It consists of a saucer-shaped mouth *a*, of japanned ware for the reception of the air, which is to be placed in the middle of the roof of a coach, and a tube *b c d* to convey it to the outside, where it is screwed into the piece *e f g*, fixed by the plate *f f* to the side of the coach. The tube is inclined a little downwards, to allow of the condensed vapour to run off at *g*.

We are not disposed to regard this contrivance (though good) a perfect invention, as a considerable stratum of deteriorated air will still occupy the upper part of the coach. If this form of apparatus be adopted, the mouth *a* should be sunk flush with the roof and the tube be wholly on the outside.

An improved Traveller's Pocket Microscope. *By* ANDREW PRITCHARD, 312, *Strand.*

THIS is an exceedingly convenient little instrument, furnished with all the requisite magnifiers, mirror, forceps, and rack and pinion adjustments, packs into a case only 2¼ inches long by 2 inches wide, without being taken to pieces, whereby much trouble is saved; and the risk of injury by misadaptation of parts, whence damage frequently occurs to optical instruments, is avoided.

Model of a New Crane. *By* Mr. ANDREW SMITH.

IN designing this machine the ingenious inventor seems to have disregarded the fact, that the great friction attending the operation of the screw as a mechanical power, renders its application to the uses of a crane extremely ineligible. It has certainly the advantage of simplicity, and also of compactness, where the height through which the weight has to be raised is inconsiderable; but the waste of effect from a given force applied, is so much greater in the screw than in that of the wheel and axle, that this departure from the usual principle of construction, does not appear to us to be accompanied by any adequate compensating benefit. In the raising of light weights through a small space with uniform steadiness and precision, where the force required is very trifling, it may be usefully applied, as it has been, by the inventor himself, as well as by others; we allude in particular to its employment in raising horizontal window shutters and blinds, where the space for the motion is extremely narrow and long; but for raising great weights under ordinary circumstances, we apprehend, it will not be adopted by persons who know the value of, or are desirous of economising power. We are sorry that we cannot honestly speak more favourably of this invention, as the industrious efforts of this able mechanic deserve better success.

At Pl. VIII. fig. 6, we give a sketch of this crane; *a* being a revolving standard, carrying the jib *b c d*: at the upper side of which is a hollow trunk containing a long screw, turning in centres at its extremities. At *d* is a nut, which by the rotation of the screw, is caused to advance or recede by sliding in a groove, or otherwise prevented from turning round: the rope *e* being attached to this nut, the operation of the winch *f* tends to raise or lower the weight. We should add, that this trunk is covered over in the model, and that we have not seen the interior; which, nevertheless, does not appear to be susceptible of any other explanation.

An improved Drill Stock. By J. HARRISON, *Clapham Buildings, Leeds.*

"THE improvement consists in the adaptation of a small spirit level towards the back end of the spindle, by observing which in setting in his drill, the workman can judge better whether he is going square with the face of his work. This little modification of a long used tool marks one of those steps by which practical science steals upon the usages of operative men, to purge them of error and uncertainty, and give to their labour the value of certainty and truth."—*Catalogue.*

An Improved Block for Rigging or Tackle. By C. RONALDS, *Esq. of Croydon.*

THE usual (but not the uniform) method of constructing pulley blocks, is, to let the sheaves turn loose upon their centre pins, the latter being fixed; the common result of which is, that the holes in the sheaves *gulley*, by reason of the superior hardness of the pins; to remedy this defect, Mr. Ronalds very judiciously fixes, or casts, the pin to the sheave, the extremities of which are turned for the axes of rotation, leaving bosses or shoulders next to the sheaves, to prevent the latter rubbing laterally against the confining cheeks. Now, although this plan is a good one, and no doubt original to Mr. Ronalds, it is commonly applied to several purposes by the Birmingham manufacturers, who distinguish pulleys of Mr. Ronalds's kind, by the term of "axle pulleys," while those which Mr. Ronalds condemns, are termed "common pulleys." The latter however have the advantage of superior cheapness, being only half the cost of the former.

There is another peculiarity in Mr. Ronalds's plan, which more immediately concerns the ship's-block makers. Instead of cutting the whole framing out of one solid piece, he makes them in separate pieces, which we suppose must be the practice in those of a large size, as it is productive of a great economy in labour and materials; but for those of small size, we are disposed to think, the cutting of the frame (or *block*) out of the solid, to be the preferable mode.

We have given at fig. 7, Pl. VIII., a sketch of this block; *a b c* being the cheeks, with the separate pieces *d d* to complete the form, which are connected to the cheeks by the screws *e e*: *f* and *g* are the sheaves.

A newly-invented Sun-Dial. By C. RONALDS, *Esq. Croydon.*

"As a check upon the proceedings of domestic time-measurers, many of which are too apt to set up a standard of their

own, Mr. Ronalds has devised a simple, economical, and elegant little apparatus, which can be set up without calling forth the mathematics of the schoolmaster, in any dwelling having a window with a southerly aspect. A wire fixed angularly into one of the bars of the window frame on the outside serves as the style or gnomon: the shadow of this is received on a shield-shaped plate of thin copper, or tinned iron, attached on the inner side of the corresponding pane of glass. To allow the shadow to be seen inside the room, an arc of a circle, about an inch broad, is cut out of the lower part of the shield, and the opening is covered with a plate of tale, rendered semi-translucent by grinding one of its surfaces. The shadow of the style may be traced on the talc plate, with a black-lead pencil, at its hourly stations with the subdivisions at pleasure, in correspondence with any good watch or clock, and the plate being moveable on the centre of the arc by the aid of a small stud, can be adjusted afterwards to a sufficiently near coincidence with mean time for all ordinary occasions."—*Catalogue.*

An Improved Billiard Table, with a mechanically-planed cast iron Bed. By SHARP, ROBERTS, & Co., *Manchester.*

Sent in by C. TOPLIS, Esq. Agent to the Manufacturers, 13, Frederick Place, Goswell Road.

"THE beds of these tables are planed with the utmost mechanical accuracy, so as to produce a perfectly flat plane; and the material ensures the avoidance of any after-change by shrinking or warping; consequently the tables do not require any subsequent adjustment, which the panneled beds of wood stand in need of every six or eight months. In all other respects than the beds, these improved tables are constructed as the best made tables are, and with the same attention to solidity and accuracy.

The large extent of metallic surface in these tables thus accurately planed is a striking instance of the augmented power now possessed by our first mechanists and engineers, in their finely constructed engines, of giving to their work, however large, the most perfect truth of structure. The uncertainty of hand work in similar operations is discarded from their establishments; and henceforth, in important machinery, there will be no excuse for inaccurate surfaces, lines, or angles."—*Catalogue.*

Model of a new Mode of Mounting a Cart's Body, used in America.

Sent in to the National Repository by J. JOHNSON.

THE object of this invention is to shift the pressure of the load according to circumstances, throwing somewhat more of it on the horse's back when he has to overcome an increased resistance—as in going up hill—and, on the contrary, to lighten the

load on the horse when he has to hang back, as in going down hill. Cart drivers will frequently enable a horse when drawing to overcome an obstacle by mounting on his back, thus causing him, by the increased weight, to get better hold of the ground.

To explain the manner in which this object is effected, we have given at Pl. VIII, fig. 8, a side elevation of Mr. Johnson's model:—*a* is the axis of the wheel, which is bended down at right angles on the inside of the wheels to *f*, where it passes through a semicircular bar of iron *i i* fixed to the shafts *s s*, on each side. When the cart is at rest, or is moved upon a smooth and level plane, the position of it will be as represented, but when the resistance of the road increases by rising ground, or any other obstacles, the axis of the wheels *a* (turning upon the centre *f* of the lever *a f*) will be thrown into the position marked *b*, with the periphery of the wheel in the position of the dotted circle *d d*; and about one-fifth of the load would thus be transferred to the horse's back, or rather 6-10ths would be supported in front of the vertical line *e b e*, enabling the horse the better to ascend an inclination of the road. On the contrary, when the cart is descending a hill of similar inclination, the axle of the wheels would be at *c*, and their peripheries at *g g*, and about 6-10ths of the load would be thrown behind the vertical line *h c h*, relieving the horse's back from the load. These positions of the wheels would not however occur but in *very great* variations of the surface; the ordinary undulations would produce *very little* alteration of the position of the wheels, owing to the pressure of the load having a constant tendency to keep their axes vertical over *f*. This plan of mounting a cart's body, however, seems to us to require more investigation to determine its precise merits than we are at present enabled to give it.*

* The Editor has to notice here an error of the press in the description of Mr. Stafford's Coach, when too late to remedy it in the text. The last line on page 111 and the first line on page 112 should have been printed thus;—"the larger weight would thus, as it were, be suspended on the *long* arm of a "lever, against the smaller weight on the *short* arm."

AMERICAN PATENTS.

Specification of a patent for an improvement in the manufacture of wheels, pinions, or movements to be employed in the construction of Clocks, Time-pieces, or other machinery. Granted to JOHN P. BAKEWELL, *Pittsburgh, Alleghany county. Pennsylvannia, October* 1, 1830.

THE said improvement consists in making the said wheels, pinions, or movements, of *glass*, instead of the substances, or materials which have been heretofore employed for that purpose. Which object may be obtained by forcibly compressing a proper

quantity of melted glass between moulds or dies, in which an indentation, or cavity, has been made of the form and size which is intended to be given to the wheel, pinion, or movement, in such a manner that the said wheels, pinions, or movements, shall be formed with the requisite number of teeth, cogs, or leaves, and shall require little, if any dressing off, to fit them for use.

The holes by means of which the arbors, or axles, and the various springs, pins, &c. are intended to be attached to the said wheels, pinions, or movements, may either be made by corresponding cores, or piercers, of the required shape and size, placed within the moulds or dies, or they may be drilled through the said wheels, pinions, or movements, after the glass is cold.

It is to be observed, that in some cases it may be more economical and convenient to make the wheel and pinion in one piece, with a hole through the centre for the arbor or axis, which may be done by constructing the moulds or dies accordingly. And that the said wheels, pinions, or movements, may either be used alone or combined with others made of any of the materials heretofore employed for that purpose.

As no claim is made to any particular construction of moulds or dies, it is considered unnecessary to describe them minutely; but any person who has been accustomed to construct the moulds or dies which are used for the purpose of making glass plates, &c. by pressure, can readily construct such as would answer for making glass wheels, pinions, or movements. And as the relative size of the wheels, pinions, or movements, and the number of teeth, cogs, or wheels in each, must depend upon the judgment of the clockmaker or machinist, no specific size can be designated, and the claim is therefore for making wheels and pinions, or movements of glass, of any size, and with any number of teeth, cogs, or leaves, and applying the same to the construction of clocks, time-pieces, or other machinery, either alone, or combined with others made of any of the materials which have been heretofore employed for that purpose.

JOHN P. BAKEWELL.

Specification of a patent for an improvement in the method of Saccharifying Rye, and other kinds of Grain; the sweet and common Potato, and other vegetable substances containing Fecula. Granted to AMABLE J. BRASIER, *of the city of Philadelphia.*

INTO any convenient vessel, (which, however, must be made of materials on which diluted sulphuric acid cannot act injuriously) I put one hundred parts of either of the above-named substances, with from one to three hundred parts of water, acidulated with from two to four parts of sulphuric acid, I then bring the whole to the boiling point, which heat I maintain during the whole time

of the operation. The heated water first converts the fecula contained in the substance employed into a mucilage, which is afterwards liquefied by the action of the acid, which, by keeping the liquid in a state of fluidity favours the saccharification.

When the substance employed is finely divided, the heated water acting upon the whole of the fecula at once, the quantity of mucilage formed, thickens the mass very much; I, therefore, when I use but little water, do not add the whole of the substance, but keep a part to add in portions when the mass is liquefied. I also usually agitate the mass to facilitate the liquefaction.

When the substance is not finely divided, the action of the heated water on the fecula being slower, the mucilage is partly liquefied as soon as formed, the mass not being thickened as in the first case, I add the whole of the substance at first; I also agitate it, but it is to divide, or the better to crush it, as the action of the heat and acidulated water soften it.

I regulate the quantity of water to be used according to the state of concentration in which I wish to obtain the sirop, and if the heating is affected by introducing steam into the mass, a quantity of water equal to that formed by its condensation should be deducted from the original quantity.

The time required for the operation varies very much, as it depends upon the nature and state of the substances acted upon; the more compact and coarse it is, and the more sparingly the acid is used, the longer period will be required; even more than four days; while, on the contrary, it may be completed in less than six hours, if the acid is used profusely, and the substance acted upon is porous or subdivided: I only give the above as a guide, for I always ascertain its termination by the tincture of iodine no longer giving a blue or purple colour to the liquid, as is the case so long as any portion of the fecula remains unsaccharified.

I then neutralize the acid with lime, or carbonate of lime, and separate if required, by filtering or any other means, the sirop from the sediment.

The sirop thus obtained may be afterwards evaporated, fermented, or applied in any way which may be found convenient.

Since I have made the above improvement, I have ascertained that the common potatoe had already been used for the above purpose, but it was first reduced to a pulp, and afterwards so treated as to require considerable labour; but I have discovered that the saccharification of the potatoe can be effected by exposing it whole to the combined action of heat, and of acidulated water. So far as the common potatoe is concerned, therefore, I limit my claim to saccharifying it without reducing it to a pulp.

What I further claim as new, and as my invention and discovery, is the saccharification, by the combined action of heat, and water acidulated by sulphuric acid, of the fecula of the substances already referred to, without separating it from their other principles, by whatever variation of the within recited process the same may be effected.

A. J. BRAZIER.

Specification of a patent for an improvement in the mode of Saccharifying Rice and Maize, (Indian Corn.) Granted to AMABLE J. BRAZIER, *of the city of Philadelphia, October* 1, 1830.

INTO any convenient vessel, (which must, however, be made of materials on which diluted sulphuric acid cannot act injuriously,) I put one hundred parts of rice or of maize, either in their natural states, or in that of flour or meal, with from one to three hundred parts of water acidulated with from two to four parts of sulphuric acid. I then bring the whole to the boiling point, which heat I maintain during the whole time of the operation; the heated water first converts the fecula contained in the substance employed into a mucilage, which is afterwards liquefied by the action of the acid, which, by keeping the liquid in a state of fluidity, favours the saccharification.

When the substance employed is finely divided, the heated water acting upon the whole of the fecula at once, the quantity of mucilage formed, thickens the mass very much; I, therefore, when I use but little water, do not add the whole of the substance at first, but keep a part to add in portions, when the mass is liquefied; I also usually agitate the mass to facilitate its liquefaction.

When the substance is not finely divided, the action of the heated water on the fecula being slower, the mucilage is partly liquefied as soon as formed, the mass not being thickened, as in the first case, I add the whole of the substance at first; I also agitate it, but it is to divide, or the better to crush it; as the action of the heat and acidulated water soften it.

I regulate the quantity of water to be used according to the state of concentration in which I wish to obtain the sirop, and, if the heating is effected by introducing steam into the mass, an equal quantity of water to that formed by its condensation should be deducted from the original quantity.

When the largest proportion of acid is used, corn, unbroken, is saccharified in about twenty-four hours, and its meal in about six. Rice, either whole, or in a state of flour, is also saccharified in about six hours. When, on the contrary, the smallest proportion of acid is used, it may require more than four days for corn unbroken, and thirty-six hours for its meal. Twenty-four hours for rice, but, for its flour, about one-fourth of that time is sufficient. As the time given above may vary, I merely give it as a guide, for I always ascertain the termination of the operation, by the tincture of iodine no longer giving a blue or purple colour to the liquid, as is the case so long as any portion of the fecula remains unsaccharified.

I then neutralize the acid with lime, or a carbonate of lime, and separate, (if required,) by filtering, or any other means, the sirop from the sediment.

The sirop thus obtained may be afterwards evaporated, fermented, or applied in any way which may be found convenient.

What I claim as new, and as my invention and discovery, is the saccharification, by the combined action of heat, and water acidulated by sulphuric acid, of the fecula of rice and maize, without separating it from their other principles, by whatever variation of the within recited process the same may be effected.

A. J. BRASIER.

For a Mode of preventing Water, and Cold, from passing under outer Doors. SAMUEL DURFEE, *Providence, Providence County, Rhode Island, October* 1.

A sloping board, such as is frequently employed as a fender, is fixed at the bottom of the door by means of hinges, which allow it to raise out of the way of the sill. There is a spring beneath the fender, which, acting upon it, tends to lift it up. A pin is driven into the door sill, near to the hinge side, and, as the door closes, this pin presses against the spring and relieves the fender from its action, which then falls by its own gravity. Above the fender a moulding is planted, which serves to throw the water from the door, on to the fender, and thus to prevent its running down through the hinged joint.

The claim is to the manner of fixing the spring, and to the moulding across the door.

For an Improvement in the Mode of making the Single Twist Auger, and the mould and machinery by which the same is made. EZRA L'HOMMEDIEU, *Saybrook, Middlesex county, Connecticut, October* 1.

THIS patent is taken for a method of twisting the spiral of the patent single twist auger, now so generally used by ship builders, and others. The patentee says, "the operation of making the twist by winding, and the mould and machinery applied for that purpose, are what I claim to have invented. The only mode of making this kind of auger, previous to my invention, being by swedging out the spiral turns with dies from a round piece, in the form of a bolt."

The drawing which accompanies the specification gives a very perfect view of the apparatus used, which will, undoubtedly, answer the purpose intended.

CLOTH OF AMIANTHUS.

THE method of preparing amianthus for the purpose of making incombustible cloth, is thus stated in an Italian Journal.

The amianthus is exposed to the action of steam, in a vessel, made for the purpose, and which will hold more than 3000 pounds of the mineral, and so that all parts of it may be acted on by the steam. The fibres, by this action, become loosened, and acquire so much flexibility that they are easily separated, so as to obtain thread as fine as silk, and of several decimetres (about four inches in length.—*Annales d'Hygiene Publique and Silliman's Journal.*

ON THE RENEWAL OF FARM ORCHARDS, AND THE EFFECT OF TRAIN OIL ON THE GROWTH OF ACORNS.

By GEORGE AIKIN, Esq.

[From the Transactions of the Society of Arts]

Harlington, Bedfordshire,
June 20, 1829.

SIR,

I BELIEVE it is a very general observation that, except where they are cultivated upon a large scale, so as to become an important article of business, farmers' orchards are, for the most part, in a very neglected state, little or no care being taken to prune the trees, or to replace them when decayed from age, or blown down by the wind. Some tenants, especially those at will, grudge the expense of new trees, and others have not liberality enough to plant where they are not sure of reaping the produce. As, in the present depressed state of agriculture, every mode of producing income is an object not to be neglected, I am induced to trouble you with this, to mention a method which I have adopted upon a property of which I have the care, of renewing the orchards at so very trifling an expense as not to be felt by either landlord or tenant.

My method is simply this: At the annual falling of underwood, I direct that all the crab-stocks shall be carefully left; these are grafted the next spring, and removed the second year to fill up the vacancies in the orchards. The same plan is followed with the cherry and wild plum stocks.

Independently of this unexpensive manner of supplying new trees, I have the advantage of being certain of the sorts which are grafted, of which the best are always selected. There is also another advantage, and that, in my estimation, of no small moment; namely, the trees, being reared upon the spot, are not affected by change of climate, as they would be if brought from a distance. I have been able to supply, by this method, about thirty apple-trees annually; a quantity quite sufficient in a few years to restore the orchards to their original state.

Last spring I set a quantity of English acorns in seed-beds, wher

they were much injured by the mice: having subsequently obtained some acorns of the *Quercus tinctoria* from America (one bushel), and being fearful they might not vegetate so quickly as I desired, I had them steeped for twelve hours in water, and then, in the hope of preventing the ravages of the mice, a quart of train oil was poured over them, and they were well stirred about, so that they all partook of the oil: the result has been, that the acorns came up very soon, without one being taken by the mice; but whether it be owing to the oil, or the remarkably quick vegetation of the acorns, I leave others to determine; certain it is, that I never saw finer or more luxuriant plants.

I am, Sir, &c. &c.

To A. Aikin, Esq. Secretary, &c. &c. GEORGE AIKIN.

OIL FOR CHRONOMETERS.

By Mr. HENRY WILKINSON, of Pall-Mall.

[From the Transactions of the Society of Arts.]

THE best olive oil in its recent state possesses that peculiar bland flavour which fits it for the table, and which appears to arise principally from the quantity of mucilage, and water, either held in solution, or mechanically mixed with it. By keeping one or two years in jars, a considerable portion of the mucilage and water subsides, which renders such oil not only cheaper, but better qualified for yielding a greater proportion of *pure* oil than that which is recently expressed from the fruit. Two or three gallons skimmed from the surface of a large jar that has remained at rest for twelve months or upwards, is preferable to any succeeding portion from the same jar, and may be considered the cream of the oil. Having procured good oil in the first instance, put about one gallon into a cast-iron vessel capable of holding two gallons; place it over a slow clear fire, keeping a thermometer suspended in it; and when the temperature rises to 220°, check the heat, never allowing it to exceed 230°, nor descend below 212°, for one hour; by which time the whole of the water and acetic acid will be evaporated: the oil is then exposed to a temperature of 30° to 36° for two or three days (consequently winter is preferable for the preparation, as avoiding the trouble and expense of producing artificial cold); by this operation a considerable portion is congealed; and, while in this state, pour the whole on a muslin filter, to allow the fluid portion to run through; the solid, when re-dissolved, may be used for common purposes. Lastly, the fluid portion must be filtered once or more through newly-prepared animal charcoal, grossly powdered, or rather broken, and placed on bibulous paper in a wire frame, within a funnel; by which operation, rancidity (if any be present) is entirely removed, and the oil is rendered perfectly bright and colourless.

HENRY WILKINSON.

DYING DRUGS FROM SOUTH AMERICA.

By Mr. R. Warrington, of Doughty Street.

In the 44th vol. of the Society's Transactions is a list of articles collected in South America by the Rev. James Thomson, and presented by him to the Society. One of these, No. 22, (p. 195), is the leaf of a tree called *Panti*, a species of cassia, which grows in the province of Quito, and is employed by the inhabitants of that country for giving a chocolate brown colour. A pair of cotton stockings, No. 23, dyed with these leaves, is a specimen of the colour which they yield. The leaves are used fresh, but whether alone, or with alum or any other mordant, Mr. Thomson omitted to inquire. Mr. Warrington finds that an infusion of the dried leaves in boiling water gives to silk, without the use of any mordant, a very delicate lilac, on which soap produces no other change than to reduce the colour in a very slight degree. Acids change the colour of the silk to a very pale reddish brown.

Silk, previously boiled with a compound acid mordant, consisting of alum, muriate of tin, and tartar, acquires a bright salmon colour; and with the same mordant, the excess of acid being neutralized by carbonate of potash, the colour is intermediate between lilac and salmon colour.

Wood acquires a reddish fawn colour, and cotton is scarcely affected by the infusion, either with or without mordants.

No. 24. The leaf of a tree called Chilca, a species of Baccharis, which grows near Quito, and is used, when fresh, for giving a permanent green to wool.

An infusion of these leaves being made in boiling water, gave to silk without any mordant, a very bright blue-green colour, which loses but little on being washed with soap. If, after being thus washed, the silk is dipped into dilute acid, the colour changes to a very pale lilac, which is again restored to its original green hue by washing with water alone.

With the compound acid mordant the colour is yellowish green, and with the neutral mordant the colour approaches, but is inferior to that produced without the use of mordants.

To wool the simple infusion of the leaves gives a dingy sea green. Cotton is hardly at all affected by it.

Some of the red fecula of the Bignonia chica, presented to the Society by Lieutenant Maw, was ground with protosulphate of iron and lime, water being added to bring it to a proper consistence: a purple-coloured solution was thus obtained, which, by exposure to air, became of a dark dirty brown.

1. 1·5 gr. of the fecula was digested in sulphuric acid, diluted with an equal bulk of water: the solution thus obtained was farther diluted with 4 oz. of water. Six strips of flannel were then put into the liquor, one being taken out after five minutes, and the rest in succession, after fifteen minutes, thirty minutes, one hour, two hours, four hours. The first piece was of a fawn colour, the last of a pale

brown brick red, and the others intermediate. Unmordanted silk acquired from the same solution a pale red colour.

2. Three pieces of flannel were mordanted; one by alum alone, one by muriate of tin, and one by a mixture of muriate of tin, alum, and tartar. On being boiled with a solution of the colour prepared as No. 1, they all acquired a red colour; the first pale and of no value; the second a full but dull brown red; and the third as full but brighter than the foregoing.

Comparative experiments were then made with pieces of the woollen cloth called *long ells*, dyed with feculà of the Bignonia, with lac-lake, and with munjeet, being previously mordanted in the three ways already described. The colour of all is red; that of munjeet being a yellow, or orange red, that of the lac a bluish or crimson red, and that of the Bignonia a brown red.

All the above specimens remain in the Society's possession.—*Trans. of Society of Arts.*

ON PERFORATING AND CUTTING GLASS, EARTHENWARE, &c.

ALTHOUGH many persons are acquainted with methods of perforating glass, &c. the following easy one I find is not so generally known as it deserves to be, and I am therefore induced to explain the mode of operating I employ, in order to produce the best results. Circumstances often conspire to render the process valuable to persons situated at a distance from large manufacturing towns, and especially to those who are living in places where they cannot readily obtain the various chemical apparatus they may require for their purpose. I have frequently found the knowledge to be of importance, not only as regards the time saved (and time is equal to money), but the facility with which the various broken and otherwise useless articles of domestic economy may be converted by its aid into convenient and useful chemical apparatus.

It will be unnecessary at present to enter into a detailed account of the various apparatus that may be constructed by any person acquainted with the process—it being my intention, on another occasion, to describe a variety of such arrangements. My present object is to describe the method by which the effect may be produced, with certainty and dispatch.

The only tools requisite in this process, are a few worn out three-edged handsaw files; these being generally made of cast steel, retain, when ground, a very fine point, which is of the utmost importance. In order, however, to give them the requisite degree of hardness, it is necessary to make their ends, for about an inch, red hot, and then plunge them into cold water; by this treatment they become hard and brittle: care is therefore required in grinding them to a proper point; this is easily effected

on a common grindstone. I generally give them a few rubs on a fine oil stone after the grinding, so as to produce a very fine point.

A cylindrical piece of any sort of wood, about two inches long, terminated by a half round end, having a hole about the tenth of an inch in diameter through its axis, may either be fastened into a common bench vice, or on a table; this constitutes the only support required.

Suppose that a glass to cover the face of a wheel barometer is wanted, through which it is sometimes necessary to make a perforation for the purpose of passing the screw of the nonius through: a proper piece of glass being selected is to be marked with a dot of ink on the place where the intended perforation is to be made; the glass is then to be held horizontally by the left hand, on and immediately over the hole in the wood support above-mentioned. A three edged file having been hardened, and ground to a fine point in the manner above described, is held firmly between the forefinger and thumb of the right hand, precisely in the position that a pen or pencil is retained when writing. The pointed steel is then to be repeatedly impinged against the glass over the spot intended to be perforated, taking care not to use too much violence; in a short time, the outer surface is removed, and by a continuation of the process, a conical piece is forced from the under surface of the glass through the hole in the wood support; the perforation so produced, never exceeds in size a pin head, but may be made as large as required by holding it over the hole in the support, and working round its edge with a fine pointed file. In this way, after a little practice, and in a very few minutes, may be perforated with ease all descriptions of glass, from the thinnest crown to the thickest plate, without any danger. Indeed, I have frequently made four or five perforations in the space of an inch square, without any fear of starring the glass, as it is technically called.

When it is required to perforate glass globes, or the upper part of wine bottles, the wood support is of course unnecessary, as the figure of the vessel gives sufficient strength without it. Wine glasses or tumblers may also be easily perforated in a similar manner; but I mostly employ another process for them. These being made of a softer sort of glass, require only to be moved by the hand backwards and forwards in the manner of drilling, on the sharp point of the file, with the occasional assistance of a little oil and emery. Indeed, any sort of glass may be perforated in this manner with ease, but I think not so quickly as by the method of punching.

All the varieties of china and earthenware may be perforated by either of the above processes with certainty; and the ingenious experimentalist will find no difficulty in turning to account many otherwise useless articles by its assistance.

It may not be amiss to mention here an easy method, which I have occasionllay employed with success, for separating the bottoms

of phials from the other parts, &c.; I pour a small quantity of sand or emery into the angular turned up part of the vessel, with a few drops of water to moisten it; then by means of a piece of wood having a sharp point, I press the moistened sand, &c. into contact with the glass, and by gently turning the bottle round, bringing the point of the wood and the sand into contact with every part of the lower end of the phial in succession; by these means, the surface is quickly scratched, and immediately after a fracture takes place all round the bottle, which instantly separates the bottom; this effect does not take place with all sorts of bottles, but in very many is does. J. MARSH.

ON THE MANUFACTURE OF SULPHURIC ETHER.

THE remark of MM. Fourcroy and Vauquelin, that the sulphuric acid employed in the fabrication of either undegoes very little change, led to the conclusion that ether would be formed as long as there was a fresh supply of alcohol to the acid. This supposition was confirmed by the experiments of M. Gay-Lussac; and since then the fabrication of ether has been considerably improved by MM. Boullay, Geizer, and others. I have for some time employed the following method; and as I am disposed to consider it more simple and less expensive than any other, a short description of it may perhaps be acceptable to the reader.

A mixture of nine parts of sulphuric acid (s. g. 1.84—1.85), and five parts of alcohol (s. g. 0.835) are put into a green glass retort of one foot in diameter, with a glass tube inserted at its upper part. This tube is 4 lines in diameter, and bent at a right angle; the shorter arm, which, at its extremity, has only one line in diameter, is plunged one inch deep in the mixture; the longer arm, of about three or four feet length, with a cock near its further end, leads into a bottle, with alcohol. The receiver consists of a refrigerator, viz. a wooden tube, filled with water, by which the distilled ether is kept cool, and two copper vessels, the one within the other, so that there is a distance of about two inches between their sides. The neck of the retort leads into the intermediate space between the two copper vessels, which is thus filled with the distilled liquid, and from which the liquid may flow off by another tube. The apparatus is used in the following manner:—When the mixture is boiling, the cock of the glass tube is opened, and the supply of alcohol thus kept up, so that the quantity of liquid in the retort remains always the same; this is continued until eight times the original quantity of alcohol has been used, which will be the case in about twenty hours, if the original mixture consisted of 25lbs. of sulphuric acid, and 14lbs. of alcohol. The first rectification of the ether thus obtained yields about its third of ether .725 sp. gr., which may of course be considerably increased by repeated rectifications, besides about

twenty to twenty-five per cent. of alcohol are regained, which may be subsequently used again, particularly for the supply of alcohol to the mixture.

Of 124 lbs. of alcohol of 0.835 sp. gr., 22 lbs. were regained; the quantity of pure ether of 0.720 to 0.725 sp. gr. at 14° R., amounted to 59 lbs., and of sulphuric acid 25 lbs. were used. The expenses of fuel, apparatus, attendances, &c. does not raise the price of the ether to more than twice that of its weight of alcohol. —*Poggendorff's Ann.*

LIST OF NEW PATENTS SEALED.

LOCKS.—To G. Barnard, of Bristol, builder, for his improvements in locks and other spring fastenings for doors. &c.—Dated May 23, 1831.—Specification to be enrolled in six months.

WARES.—To J. P. Westhead, of Manchester, manufacturer, for his improvements in the manufacture of small wares.—May 23, 1831.—Six months.

SPINNING MACHINES.—To T. Knowles, Charlton Row, Lancashire, cotton-spinner, for his improvements in machinery, by aid of which the machine, commonly called mules, are, or may be, rendered self-acting, &c. —May 23, 1831.—Six months.

INKING-APPARATUS.—To R. Wood, of New York, America, but now of Bishopsgate Street, for an inking apparatus, to be used with certain descriptions of printing presses.—May 24, 1831.—Four months.

PURIFYING WATER.—To T. Westrup and W. Gibbins, of Bromley, Middlesex, gentlemen, for their improvements in converting salt or other water into pure or fresh water.—May 24, 1831.—Six months.

PROPELLING.—To S. Hobday, of Birmingham, Warwickshire, steel-snuffer and toy manufacturer, for his improvement in a machine, to be worked by steam, that may be applied for the moving of ships' boats and barges on the water; and to carriages either on the roads or tram-ways, &c.—May 24, 1831.—Six months.

RAISING WATER.—To R. Fell, Fountain Yard, Vauxhall Bridge Road, plumber, for his improvements in machinery for raising water, &c.—May 24, 1831.—Six months.

NEW MANUFACTURES.—To N. H. Manicler, Union Road, Southwark, Surrey, chemist, and J. Collier, of Canal Grove, New Peckham, Kent, civil engineer, for a new manufacture of useful products from a certain oleagenous substance.—May 31, 1831.—Six months.

SPINNING.—To S. Lambert, of Regent Street, Middlesex, gold laceman, for an improvement in throstle-spindles, for spinning and twisting silk, cotton, wool, flax, and other fibrous substances. Communicated by a foreigner.—June 2, 1831.—Three months.

GAS.—To T. Spinney, of Cheltenham, Gloucestershire, gas-engineer, for his improvements in apparatus for manufacturing gas for illumination.—June 4, 1831.—Two months.

CARRIAGES.—To J. Pearse, of Tavistock, Devonshire, ironmonger, for his improvements on wheel carriages, and in apparatus to be used therewith.—June 7, 1831.—Six months.

PAPER.—To N. Fourdrinier, of Hanley, Staffordshire, paper-maker, for a machine for an improved mode of cutting paper.—June 20, 1831.—Six months.

MANGLES.—To J. L. Stephens, auctioneer, and P. Waycott, clock and watchmaker, both of Plymouth, Devon, for their improvements in mangles. —June 22, 1831.—Six months.

PATENTS ENROLLED BETWEEN 10TH JUNE, AND 10TH JULY, 1831.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

CLOTH MANUFACTURE.—To Thomas Walmsley, of Manchester, in the county of Lancaster, Manufacturer, a patent for "improvements in the manufacture of cotton, linen, silk, and other fibrous substances, into a fabric or fabrics applicable to useful purposes," was granted on the 13th of December, 1830, and the specification was enrolled in the Enrolment Office on the 13th of June, 1831.

The intention of the patentee is, the fabrication of a species of cloth from any of the fibrous substances mentioned in the title, either separately or mixed, by laying them out in thin fleecy sheets, and then uniting the fibres by means of starch, flour, paste, glue, or other glutinous substances. There are various methods of performing this; but the following is that which the patentee has practised:—

The cotton or other fibrous matter, is first to be opened or *teazed* by the process usually employed in preparing it for the carding engine; it is then passed through a carding engine, from the *doffer* cylinder, of which it is delivered on to an endless felt, the rollers of which are of a suitable length to the width of the intended cloth, and placed so far apart as to make eight or ten yards of cloth at a time. By the revolution of the endless web, any required number of layers are successively received from the doffer cylinder, and they are slightly pressed together by passing between one or more pairs of cylinders for that purpose; when the fleece or cloth is of sufficient thickness, it is "broke" or cut across, and carefully conducted to an apparatus for receiving the glutinous matter. This apparatus consists of a pair of cylinders revolving in a horizontal position; the lower cylinder being partly immersed in a trough containing the starchy or glutinous fluid, and the upper one rests upon the lower, by its axes being confined only laterally, which are weighted to give considerable pressure. The cloth, therefore, in passing through this apparatus, has the glutinous matter delivered to it by the lower roller; and by the great pressure of the upper, it is distributed and squeezed between every fibre, so as to make them adhere to each other without being superabundant in quantity: the latter being partly regulated by a

ductor in the trough before mentioned. From this apparatus, the cloth is immediately conducted to a series of drying cylinders heated by steam, which completes the operation. The starching apparatus used by the patentee, he states, is the same as that employed in preparing cotton yarn for warps, and the dying apparatus, the same as used by dyers.

The patentee observes, that the same kind of cloth may be produced (though not so readily and perfectly) by delivering the fleece from the doffer in layers on to a web or spreading out frame which has a reciprocating motion, and the pressure may be given by weighted blocks, &c.; accordingly, the patentee does not confine his claim of patent-right to the machinery he uses, and has described, but to *all cloth of the same kind however produced.*

We think the patentee has not been well advised in making so extensive a claim; as a *manufacturer* he probably knows better than us, what has been done in manufactures of the kind prior to his patent: but a perusal of our former volumes would lead the uninitiated into the opinion, that he claims rather more than his own share in the discovery. We have not time to make the researches we might otherwise be disposed to do, and we will, therefore, only refer the reader to our fourth volume, N. S. pages 222 and 233.

SHOWER BATHS.—To J. L. Benham, of Wigmore Street, Cavendish Square, Middlesex, a patent for "improvements in shower and other baths," communicated by a foreigner residing abroad, was granted on the 13th of December, 1830, and the specification was deposited in the Enrolment Office on the 13th of June, 1831.

The operation of the usual shower baths, our readers well know is, that the water is made to descend like rain upon the head of the bather; and the improvement contemplated is to make the baths rain also, horizontally and upwards, so as to operate upon the person at all quarters, either successively or simultaneously, at the pleasure of the bather.

The apparatus consists of a large hollow cylinder of metal or wood, placed vertically, of sufficient height and breadth for an ordinary person, with a hinged door glazed at the upper end, and having a well underneath the perforated floor of the bath: a reservoir for water is fixed above, which is supplied from the well beneath, by means of a pump worked by a handle inside the bath; so that the bather may repeat the showers as often as he pleases,

by transferring the water from the well to the reservoir. The latter is of an annular figure, having a cavity in its centre, containing at its bottom a very shallow circular vessel, closed on all sides except at the bottom, but perforated in the usual manner, and having a short pipe communicating with the lower part of the annular reservoir: and by the bather turning a stop-cock fixed on the short pipe just mentioned, he discharges the water from the reservoir, through the central shallow vessel over his head; and this constitutes, in effect, the ordinary bath, though differently modified.

From the reservoir there also depends three pipes; one of them conducting the water into three circularly curved pipes, fixed equidistantly and horizontally in the interior of the bath, and perforated with numerous small holes, through which the water rushes laterally in minute jets upon the body of the bather, upon the turning of a cock in the said pipe. Now as the door-way prevents the curved pipes being continued in unbroken lines all round, separate pieces of perforated curved pipe are fixed to the door, and to these is attached a vertical pipe of communication, with a flange at its upper end, bent into such a position, that when the door is closed the flange comes into close contact with another flange fixed to the lower end of another piece of pipe, whose upper end opens into the reservoir above; the water from which is prevented from descending by a stop-cock in the upper pipe. Leather collars or washers are fixed to the metallic flanges, so that when the door is closed a sufficiently water-tight joint is produced, and the bather having turned also this stop-cock, as well as the last-mentioned, he has three entire rings of jets playing upon him.

The third pipe descends to within two feet of the floor of the bath, when it is turned upwards a few inches, and is conducted to a cross or T piece; the cross being perforated on the upper side, so that when the bather turns the cock on this pipe, he has a series of jets playing upwards upon his person: and he may thus be showered upon downwards, sideways, and upwards simultaneously, by turning the aforesaid three stop-cocks. These arrangements can likewise be applied to any of the ordinary shower baths, and we cannot but regard them as decided and valuable improvements.

In the previous specification, we found fault with the wideness of the claim made by the patentee; the claim made in this, however, possesses a defect of a contrary character, being simply for the construction of shower baths with lateral and upward jets, produced *by means of the pipes described.*

PROPELLING BY STEAM.—To Richard Witty, of Basford, in the Parish of Woolstanton, in the county of Stafford, Engineer, a patent "for certain improvements in apparatus for propelling carriages, boats or vessels, and for other purposes, by the power of steam," was granted on the 13th of December, 1830, and the specification was enrolled in the Petty Bag Office on the 13th of June, 1831.

The patentee states his object to be the obtaining of a direct *rectilineal* motion from the steam engine, in conjunction with the ordinary angular motion, (which is converted into circular by the rotation of the crank) and to apply these joint forces in the propelling of carriages and vessels.

The apparatus by which he proposes to obtain this double effect, consists, of three cylinders *fixed* horizontally to a framing, with their closed ends towards the fore part of the carriage or boat, the other ends of the cylinders being left quite open to the atmosphere. The steam is let on through slide valves, placed near their closed ends, which by its expansive force against the piston impels it to the open end of the cylinder, and by its rod gives rotation to the crank, which is connected to gear for driving the carriage or boat forwards; but while this action is taking place, the patentee considers there is also a reaction of the steam against the closed ends of the cylinders, causing them to move from the pistons, and equally assist in propelling.

To prevent *any* misconception arising from our statement of the views of the patentee, we have given a diagram explanatory of the drawings attached to the specification, at fig. 4, Pl. X.; where *a* represents a carriage; *b* one of the cylinders closed at the fore end and open at the rear; *c* a slide valve, alternately operating upon the induction and eduction passage; *d* a piston, with its rods *e f* giving motion to the crank, the revolution of which moves the carriage in the direction shown by the arrows over the wheels. There are three such cylinders, which operate successively upon a crank having three equidistant throws. As it must be obvious that the steam acting only on one side of the pistons, there would be no means of reversing the motion of the carriage; to effect which, therefore, the middle cylinder of the three is closed at both ends, and provided with valves also at each end, in the usual manner.

We think it quite unnecessary to inform the readers of the Register of Arts, that the patentee has conceived some very erroneous notions respecting the nature of force and resistance,

and that no possible advantage can be obtained by the arrangement proposed, which differs not, in any *essential* respect, from the usual mode of propelling.

ARTIFICIAL BONE CHARCOAL.—To Marie Elizabeth Antoinette Pertius, Spinster, of No. 5, Rue de Bac, Paris, a patent "for the fabrication or preparation of a certain species of coal, fitted for refining and purifying sugar," (communicated by a foreigner) was granted on the 23rd of December, 1830, and the specification was enrolled in the Petty Bag Office, on the 23rd of June, 1831.

The intention of the patentee is sufficiently expressed in the little foregoing title, but the materials and the processes described in the specification seem to us but ill adapted to effect it. The materials proposed are stated to be, generally, such animal and vegetable matters as will form an admixture with clay and sand, giving the preference to those that are plentiful and cheap; namely, tar condensed in the preparation of coal gas, peat, tanners' waste, or spent bark, blood, bones exhausted of their gelatine by the glue makers, river sand, sea-port mud, clay, &c. and these in various proportions, according to their peculiar properties, (real or supposed?) are to be made up into paste, lumps or balls, with a saturated solution of the muriate of soda, (common salt) or a solution of any other of the earthy alkaline muriates, and in some instances with a solution of muriatic acid, or Glauber's spirit of salts, alone, as we shall now proceed to detail.

In situations where the following substances can be had plentifully and cheap, they are to be employed in the proportions named, viz.—

250 parts of river sand,
50 parts of clay,
50 parts of common salt, and
100 parts of gas tar, or molasses, or blood.

The clay is to be broken into small pieces and softened into a paste; the salt is to be dissolved in the least necessary quantity of water, and then be mixed with the sand; then mix the clay paste with the salted sand, and afterwards add the tar, molasses, or blood; form the mass into cakes or balls, dry them; then place them in a calcining furnace, in such vessels and in the manner ordinarily used in the preparation of ivory or bone-black. When the calcination is completed, the coal is to be taken out,

ground in a mill to the requisite fineness of grain, and then washed, to free it from all acid taste. The process is now considered complete, as the patentee observes, that this black, whether wet or dry, will be equally efficacious in the refining of sugar, and answer the same purpose as the ordinary bone-black.

In the vicinity of sea-ports, a preference may be given to the application of the mud therein deposited; in which case the following materials are to be employed to fabricate the coal, in the proportions named.

300 parts of sea-port mud,
50 ——— common salt,
100 ——— gas-tar, blood, or molasses.

These substances are to be mixed, (how, the specification explains, but we need not) then balled, dried, calcined, ground, and washed, as aforesaid; thus is produced *Coal, No.* 2.

Where peat, or tanner's waste bark is sufficiently plentiful and cheap, the arrangements are as follows; take

300 parts of peat, or tanners' spent-bark,
75 ——— clay,
60 ——— salt,

mix, ball, dry, calcine, grind, wash, and you will have *Coal, No.* 3.

In the neighbourhood of bone-glue makers, get

100 parts of their glueless bones, and add thereto
10 parts of tar.

The bones may be ground either fine, or to the state of coarse gunpowder, the latter when the product required is grain charcoal; the mixture is then to be made, and the several operations before named being performed, with the exception of washing, *Coal, No.* 4, is the result.

To revivify or restore the properties of bone-coal which has already been used in the refining process, take

100 parts of the black mess, and add thereto
20 parts of salt,

these having undergone all the operations aforesaid, forms *Coal, No.* 5.

The quantities of each substance named in *parts*, it is to be understood, is by *weight in the dry state.*

SPINNING CASHMERE WOOL.—To Charles Stewart Cochrane, of Great George Street, Westminster, Esq. a patent for "certain improvements in the preparing and spinning of Cashmere wool," the communication of a foreigner, was granted on the 13th of November, 1830, and the specification was enrolled in the Petty Bag Office on the 13th of May, 1831.

It is a fact not so generally known as it deserves to be, that the greater part of the Cashmere wool, which is manufactured into shawls to imitate the Indian shawl, is first brought to this country by our East India shipping, and afterwards sent to France to be prepared and spun into yarn ready for the weaver; much of it is then returned to this country to be woven: a circumstance which shows, that in this instance at least, we are behind our neighbours in the construction and application of manufacturing machinery.

With a view to supply this evident deficiency in our manufactures, Mr. Cochrane has introduced and patented the whole of the machinery and process which have been secretly and successfully used for many years by M. Hendenlong, of Paris. The process of preparing is commenced by beating the wool with sticks, to loosen and remove a portion of the dirt incorporated with it as imported. The knotty portions are then to be separated by hand, for which purpose women and children are employed, till the moss assumes an uniformity of appearance, the long and coarse hairs being at the same time picked out; a process which is carried to a greater or less extent according to the fineness of the fabric intended to be produced. The coarser portion is employed by the hat or felt manufacturers; and the finer portion is then to be submitted to hand carding, using the cards with two rows of teeth, and about thirty-two teeth in each row.

The patentee proposes to substitute for these operations, a preparing machine, which consists of six rollers or cylinders, about ten or twelve inches in diameter, and three feet long: three of them furnished with a series of needle points projecting from their surfaces, and the other three with hogs' bristles. The one set forms a series of cylindrical cards, and the other a series of cylindrical brushes; and they are fitted into a horizontal frame, with a card and brush cylinder placed alternately, so that the wool is first received from a feeding board upon a card cylinder, thence it is transferred to a brush cylinder, then to a card cylinder again, and so on till it is delivered upon a larger or doffer cylinder. When the wool is thus far prepared, whether by hand or machine,

it is to be cleaned by repeated washings with soft soap and water, and subsequently subjected to the operations of carding machines and roving frames, which do not materially differ from some of the machinery used in this country for preparing wool for spinning. An account of these, as well as the drawing and pressing rollers, the mule, &c. we are under the necessity of deferring till a future opportunity enables us to accompany our description with illustrative drawings.

SPINNING.—To William Needham, of Longour, Staffordshire, a patent for "improvements in machinery for spinning, twisting, and doubling silk and other fibrous substances," was granted on the 13th of December, 1830, and the specification was deposited in the Enrolment Office on the 13th of June, 1831.

The object contemplated by this patentee is to combine the means for performing all the above operations in the same machine. Fig. 3, Pl. IX. represents a side elevation of a principal part of the machine, by which the chief novelties of the invention can be readily pointed out. *a a a* show the frame of the apparatus; *b b* the pulley or drum through which motion is communicated to the different revolving parts; *c c* are two bobbins containing the single strands of silk to be doubled and twisted. The single strands from the bobbins are conveyed through the eyes *d d*, in the dove-tailed pieces *e e*, which being raised or lowered in corresponding grooves cause the strands to approach and meet at a greater or less angle according to the twist required.

The strands are then passed over a little tin saddle *f*, and brought together through an eye at *g*, and thence they are conveyed together to the twisting frame *h h*; which is made to rotate on an axis at *i* by means of the pulley *k*, for the purpose of twisting the thread. On the lower end of the axis *i* is fixed a stationary bevil wheel *l*, which gives motion through another bevil wheel *m* to the pinion *n*, and that communicates motion to the wheel *o* fixed on the axis of the reel *p*; and by this means the taking up motion of the reel is obtained. On the other end of the axis of the reel is fixed a pinion *r*, which gives motion to a wheel *s*, which communicates motion to a horizontal wheel *t*; upon the face of which a pin projects upwards, which gives motion to a lever having one of its ends turning on a pivot, and the other provided with an eye through which the thread passes, and by the alternating motion of the lever the thread is distributed evenly on the reel.

The small tin saddle *f* is attached to one of the ends of a long lever which turns on an axis *u*; the other end of this lever extends alongside of the drum *b*, and carries a wedge shaped piece *v*, which being made heavier than the saddle end, descends when left at liberty, and falls in between the drum and the head of the locking pin *w*, which when drawn out by this means, releases the drum *b* from the carrying wheel *x*, fixed upon the main shaft or axis, while it is permitted to run freely without the drum when the locking pin is withdrawn.

As the saddle end of the lever is not sufficiently heavy to keep the other end from descending and stopping the motion of the drum, and consequently, of the whole machine, a slight rod, capable of moving horizontally, is placed over the saddle end to give it a preponderance; it is furnished with an eye at its extremity through which the threads pass. Now in case of either of the strands breaking, the other would be at liberty to assume immediately the straight position, by which the upper rod would be removed off the lever, permitting it to ascend by the superior gravity of the wedge-shaped piece at its other end: and thus the apparatus becomes so far self-acting as to stop itself by this ingenious contrivance whenever a thread breaks.

CARRIAGE SPRINGS.—To A. Graham, of West Street, Finsbury, London, a patent for "improvements in the application of springs for carriages" was granted on the 17th of December, 1830, and the specification was lodged in the Enrolment Office on the 17th of June, 1831.

This invention, which is said to be the communication of a foreigner residing abroad, consists in the introduction of a lever of unequal arms, between the springs and the carriage to be supported, or between the springs and frame which supports it; the carriage being attached to the shorter arm, and the spring to the longer, by which, the patentee contends, the jolting motion of the carriage will be greatly diminished. At all events, by this arrangement, it will require springs of greater extent of elasticity to allow of the same change of relative positions of the carriage and its supporting frame that takes place with springs attached in the usual manner.

One of the modifications proposed by this patentee, is shown at fig. 1, Pl. IX., and another at fig. 2, on the same plate. In the first, *a a* represents the carriage, and *b b* a portion of the supporting frame; *c c* is a compound spring, the middle of

which is attached to the carriage, and the extremities to the levers *d d*, which turn on the fulcrums *e e* connected by crane necks to the frame *b b;* a second pair of crane necks *f f* proceed from the carriage to the levers, to which they are jointed, about a third of its length from the fulcrum.

In will be perceived, that from this arrangement the motion of the ends of the spring, relatively to the supporting frame, will be thrice that of the carriage body. Of course the same arrangement of springs and attachments must be made on each side of the carriage; and the levers on each side are connected together by means of the axis constituting their fulcrums, extending from one side to the other.

A second modification of Mr. Graham's invention is represented by fig. 2, Pl. IX., where continuous levers or pulleys, similar to those denominated wheel and axle, are substituted for the levers described in the last. These pulleys may be fixed on the axis which extends across the carriage, either concentrically or with the smaller eccentrically, as shewn in the drawing; where *a a* represents a portion of the framing of the carriage body; *b b* two crane neck pieces projecting therefrom; *c c* two leather straps, which connect the crane necks with the smaller pulleys *d d; e e* are a pair of compound springs fixed to the perch or frame which supports the carriage, and connected by the leather straps *f f*, with the larger pulleys *g g*. The action of the springs thus arranged will be similar to their action when arranged as in fig. 1; but the resistance to the approach of the carriage to the supporting frame will be much more rapid in fig. 2 than in fig. 1, as the eccentric pulley will have the effect of diminishing the length of the shorter arm of the lever as it is turned by the weight of the carriage. *h h* show two crane necks connecting the cross axles with the supporting frame.

The patentee does not limit his claim to any of these methods of carrying his invention into effect; but he claims the introduction of the axis with its levers, whether continuous like a pulley or not, between the spring and one of its attachments.

WOOLLEN CLOTH.—To J. Ferrabee, of the Trupple Mill and Foundry, in Stroud, Gloucestershire, Engineer, a patent for "improvements in machinery for preparing the pile or face of woollen or other cloths requiring such a process," was granted on the 23rd of December, 1830, and the specification was deposited in the Enrolment Office on the 23rd of June, 1831.

The object of this patentee is to raise the pile on the surface of the cloth in directions sloping from the middle of the web or piece towards each selvage; which he effects by employing two series of teasles; each series attached to an endless chain which passes round two cylinders, by which it is put in motion. Two of the cylinders which support and give motion to the teasle chains are placed with their axes extending along the middle of the piece of cloth to be operated upon, and the other two cylinders are placed near the selvages of the cloth, with their axes parallel thereto. Each pair of cylinders are made to turn in a direction to raise the pile on the cloth from the middle towards the selvages, at right angles to them when the cloth is at rest; but when an end motion is given to the cloth, which is effected by meaus of two cylinders placed at right angles to the teasle cylinders, the pile is raised in an angular direction, sloping from the middle towards the selvages. The angle of the work may be varied at pleasure by varying the relative speeds of the different sets of cylinders.

The cloth is to be supported under the teasles either by a cylinder or flat stage; but as this, as well as some other parts of the apparatus, do not differ materially from those in common use, and form no part of the patentee's claim, we have not deemed it necessary to describe them more minutely than to give the reader a general idea of the patentee's intentions, and the nature of his invention.

GENERATION OF STEAM BY HEATED METAL.

In boilers of high pressure engines, the heat applied to a part not containing water, sometimes raises that part of the boiler to a dull red heat, which suddenly coming in contact with a portion of the contained water, generates steam with such rapidity as to burst the boiler. In order to ascertain the eflect of different metals, raised to different temperatures, in generating steam from boiling water, a series of experiments have been undertaken by Mr. Johnson, of Philadelphia, which contain the following results. He found by immersing iron raised to different temperatures in boiling water, that more steam was generated in a given time by iron of a red heat, just visible in day light, than by the same piece of iron raised to a white heat. This may arise from the greater quantity of steam forming an atmosphere around the white hot iron, and thus preventing the water coming in contact with the iron. The steam generated bears a strict relation to the weight of the metal, being about one pound of steam for every nine pounds

of iron. In comparing cast iron with malleable, he found that cast iron raised to the same temperature generate more than wrought iron, being about one pound of steam for every eight pounds and a quarter of iron.—*Silliman's Journal.*

NOTE ON THE METHOD OF MAKING HAY IN THE TYROL.

By W. Brockedon, Esq.

[From the Transactions of the Society of Arts.]

29, *Devonshire Street, Queen Square,*
January 17, 1830.

Sir,

If the following remarks upon the practice of the Tyroleans in the preservation of their hay-crops be not, in your opinion, undeserving the attention of the Society of Arts, you will oblige me by communicating them.

I have observed, in the course of my journeys in the Alpine districts, that the hay is preserved in the meadows and on slopes, in situations where the cocks are exposed to the action of torrents, by being cocked upon stakes having two or three transverse pieces of wood fixed in them, as shewn in fig. 9, Pl. IV. The stake is light, about five or six inches in circumference, and about four or five feet long. These are kept by the farmers in large quantities, and stowed away compactly during winter under the overhanging roofs of their dwellings. When used, they are driven upright into the ground at convenient distances, and the grass, when cut, is thrown upon them: it is supported upon the cross pieces or arms of the hay-stake, on which a large cock may be formed, as shewn by dotted lines, the lower part of which is free from the ground, whilst the outside, raked smooth, carries off the rain; in this manner it is often left for weeks, if necessary: the air, freely entering and circulating, dries the hay, and frequently it is never spread except during part of the favourable day in which it is housed. It has occurred to me, that if a similar plan were adopted in our meadow lands, a large quantity of excellent hay might be saved which is now destroyed by wet. The stakes are very simple in construction, and the cheap rate at which they may be made in England would not prevent their adoption.

I am, Sir, &c. &c.

A. Aikin, Esq.
Secretary, &c. &c.

Wm. Brockedon.

FORTH AND CLYDE CANAL.

We give insertion to the following extracts from a report made by a Committee of the company to the proprietors of the above-mentioned important work, as affording a highly gratifying and instructive account of the practical application of the successive improvements made in canal navigation during the last sixty years; and embracing a notice of the rapid progression made in the rival modes of conveyance. In our former numbers we gave from common report, an account of some important experiments made on canals at great speeds, and it is highly gratifying to find those statements confirmed by this report, as they prove that such *accelerated motion may be obtained without injuring the banks, and at a less expense of power*; overturning all the preconceived notions of the public on this point; moreover shewing, that the application of steam as a propelling power in canal conveyance, has only been retarded by ignorant prejudice, or self-interest.

"When the Forth and Clyde Canal was established in 1768 (and for many years thereafter) canal conveyance was incomparably superior to every other in point of cheapness. During that period the high roads of this country (even the best of them) from their improper lines of direction, and their general bad condition, were unfit either for the speedy carriage of light articles, or the slower transport of bulky and heavy goods, This prevalent inferiority of other conveyances begot a general opinion that canal conveyance was perfect, and that it neither required, nor was susceptible, of improvement.

"The consequence of this general opinion has been, that during the last fifty years, scarcely any attempts have been made by canal proprietors for improving the established system, except by the widening and deepening of some canals. In the second of these respects (or deepening) considerable improvements, attended with great expense, were effected on the Forth and Clyde Canal; its depth having been increased, first from seven feet of water to eight feet, and afterwards to upwards of nine feet.

"In the mean time, however, great improvements were in progress, and have been carried into effect, on all turnpike roads—insomuch that a cart, drawn by one horse, can now carry double the weight, and at a much greater speed, than what it could have done in the year 1780. The speed with which passengers can be carried, by coaches and chaises, along the turnpike roads, has also, during the same period, been doubled. It is plain, therefore, that, unless these improvements on the roads be balanced by corresponding improvements in the speed and facility of canal conveyancee, the trade on canals will necessarily be diminished, or at least be prevented from being, as hitherto, progressively on the increase.

"The chief danger, however, to which canals are now exposed, has arisen from recent improvements on railways, but principally from exaggerated accounts that have been published, and delusive opinions now prevalent on that subject, which threaten to occasion the construction of railways, in situations where there are hardly

sufficient materials for supplying a limited and moderate trade to the already-established conveyances, and still less for affording a remunerating trade both to these conveyances and a railroad.

"It is true, that the trade on the Forth and Clyde Canal is materially different from that on most other canals, as it arises chiefly form the direct passage of sea vessels through the canal, or between the City of Glasgow, situated near the centre of the canal, and a number of different British and Foreign sea ports. By this means, the Forth and Clyde Canal is not exposed to the like competition to which other canals are liable, whose trade consists in the carriage of articles from one particular point to another, or from one part of the canal to another. Still, however, your committee see the necessity of a general improvement of the canal navigation, in order to preserve and increase its present trade; and they have, therefore, for some time past, been sedulously engaged in two several measures, by which they trust that the trade and revenue of the canal will be founded on a sure and certain basis, with every prospect of increasing with the progressive improvement of the commerce and prosperity of the country.

"The first of these measures, is *lining or facing the upper part of the canal banks with stone, and at the same time raising the height of the banks, so as to admit of an additional depth of water on the surface*; and the second, is *the general introduction on the Canal of Steam Navigation.*

"The necessity of the first measure appears from this circumstance, that at present many of the large sea vessels navigating the canal are, when fully loaded, of so deep a draught of water, that it is necessary to lighten them during their passage through the canal, which occasions considerable interruption, delay, and expense in the transhipment of part of their cargoes into lighters, and the freight of these lighters. In pursuance of the first measure, therefore, the committee have lined with stone nearly one half of the upper reach or level of the canal (where vessels are most frequently obliged to have recourse to the assistance of lighters,) and at the same time that this stone lining was made, the banks have been raised in height. The entire length of the upper reach of the canal will, in the course of the present year, be faced with stone, and be made ready for receiving an additional depth of water, which, besides enabling the larger vessels to navigate the canal with full cargoes, free of the expense of transhipment and lighterage, will lessen the expense and facilitate the trackage, of every vessel plying on the canal; it being ascertained, by experience, that an increase of depth of water greatly facilitates and expedites the trackage of vessels on canals. This improvement will also be soon extended to all parts of the canal. The stone facing, coming in place of turf and clay, will effect also a great saving in the constant expense of replacing this turf and clay, which was very quickly washed down by the surge, and which, filling up the bottom of the canal, formed shoals or banks, which interrupted the trade, and put the canal company to the expense of clearing the bottom of the canal by dredging boats, and removing the shoals

formed by the clay thus deposited. The prevention of these interruptions, and the facilitating of the trackage, will be an equal benefit to the canal company, their traders, and the public.

"With regard to the second measure proposed, viz. the introduction of steam navigation, it falls to be considered under three distinct heads. First, the cheapness and expediting of canal carriage, by the use of steam boats, for dragging other boats along the canal and neighbouring firths or arms of the sea.—Secondly, the use of steam vessels fitted for carrying goods, not only along the canal, but also between Port Dundas (the harbour of the canal at Glasgow) and the different sea ports on the East and West Coasts of Britain, and the neighbouring ports of Ireland, and elsewere; — and, Thirdly, the use of steam boats for the speedy conveyance of passengers and parcels: and thus obtaining to the canal a portion of the large sums now expended on the coaches at present established on the turnpike roads running parallel with the canal.

"So long ago as the year 1802, a trial was made, by direction of the late Lord Dundas, of a steam boat for dragging other vessels along the canal. This was the first public trial of steam for a useful purpose in navigation. In consequence of the imperfect success of this trial, but chiefly in consequence of the pre-conceived opinion, of all the directors and officers of canals, that the action of steam paddles would be destructive to canal banks, the further prosecution of this measure was dropped, and steam navigation, in place of being first introduced into actual practice in Great Britain, was established first in America.

"In the year 1812, in consequence of the success of the measure in America, a trial of steam navigation was made with success on the river Clyde, which led to the complete establishment of steam navigation on that river, and afterwards on most of the rivers and coasts of Britain and Ireland. The prejudice against the use of steam vessels on canals, however, remained still in force until the year 1828, when Mr. Murray, inspector of works on the Forth and Clyde Canal, observing that the Cupid, one of the smaller steam boats employed on the Clyde, was of such a size as to admit of her passing through the canal locks and bridges, proposed to the governer and committee of council, that they should hire the Cupid, and make a trial of her performance on the canal. This proposal being adopted and acted upon, the Cupid was brought into the canal, and full trials were made with her in the presence of one of the first engineers now living, Mr. Watt, of Birmingham, (a canal proprietor.) An account of these trials, and a report of Mr. Watt's opinion, appear in the sederunt book of the committee, on the 6th day of November, 1828. This trial of the Cupid was made and directed solely with the view of proving the capability of steam boats as draggers of other vessels on the canal; as, from the necessary contraction of the beam or breadth of a steam boat on the canal (in order to have room for the side paddles in passing the canal locks, which are only twenty feet wide) the bearing or tonnage of such boats was necessarily very limited, and they would carry only a very small cargo.

"From the result of these trials, Mr. Watt reported to the committee, that it appeared the expense of drawing vessels along the canal by a steam boat employed as a dragger, would not amount to more than one half of the expense of horse-power, provided the steam dragger could have constant and regular employment. From the uncertainty of obtaining this constant employment, owing to the irregularity of the arrivals and entries of sea vessels into the canal from the various sea ports, the committee have not yet thought it advisable to attempt the establishment of steam draggers on the canal, although they have never lost sight of this measure, and still keep it in view. The experiments in question, however, clearly proved the safety and practicability of the use of steam boats in the canal, and exposed the fallacy of the opinion that any greater wave or surge against the banks was occasioned by the paddles of a steam boat, or by a steam boat passing along the canal, than by other vessels of the same dimensions or burden, and moving with the same speed. The wave was found to rise or fall just in proportion to the velocity of the motion of the boat through the water; and the Cupid, when moving at the rate of four or five miles an hour, raised no surge that could be dangerous or hurtful to the banks more than that of other boats.

"Although the committee, therefore, deferred, for the present, the establishment of steam-draggers, their attention was naturally turned to the second object above-mentioned, as attainable by the use of steam; viz. the use of steam vessels of a sufficient burden for carrying goods in their holds, along the canal, and between Port Dundas and the different sea ports on the Firths of Forth and Clyde, and the coasts of Britain and Ireland. The difficulty, however, of framing a steam boat, which, with the paddles, would be fitted to pass easily through the canal bridges and locks, and, at the same time, have such dimensions and bearings as to be sufficient for carrying a proper cargo, and the danger of the paddles, if placed on the side, being destroyed by collision with the sides of the canal, or its locks and bridges, presented most serious obstacles to the success of this measure. But Mr. Thomas Grahame (one of the committee) having learned that on some of the North-American rivers, steam paddles, instead of being placed on the sides of the boats, and thus increasing their breadth, were placed at the stern, (the outsides of these paddles not extending beyond the outside lines of the sides of the vessel), and Mr. Grahame having obtained from America a drawing and section of a stern paddle steam-boat, the committee determined to construct and try a steam boat of this description on the canal.

"For this purpose they contracted with Mr. Neilson, Engineer at the canal old basin, to alter and enlarge the company's iron passage boat, Cyclops, which had been built in the year 1825, and to fit her up with a common steam-engine, of fifteen horse-power, for working stern paddles; and Mr. Neilson having fulfilled his contract, the committee employed the Cyclops, as a regular trader between Port Dundas and the town and harbour of Alloa on the Firth of Forth.

Notwithstanding the great weight of the Cyclops, from the thickness of the iron plates with which she had been originally built, and the great weight of her steam-engine, which is a low pressure condensing engine, and although she is much under the width of the ordinary canal vessels, she is fitted to carry a cargo of forty tons, and makes the voyage between Alloa and Port Dundas (a distance of upwards of ten miles of sea, and of twenty-nine miles along the canal, in which she passes through twenty locks, being in all a voyage of forty miles and twenty locks) in a space shorter than vessels of a like burden can be tracked by horses the shorter distance from Grange-mouth to Port Dundas; and this in all weathers, and with the same regularity as land carriage. She has thus secured to the canal, the carriage of the whole goods passing between Alloa and Glasgow; of which, scarcely any were previously carried along the canal, owing to the uncertainty of making the sea part of the voyage regularly in common sailing vessels.

"This instance of what has been effected, on the canal of Firth of Forth, by the Cyclops, has completely and satisfactorily proved the fitness of a steam as a moving and carrying power on the canal, and firths adjacent to it; and it only remains to be proved that this kind of navigation can be extended to the sea coasts outside of the firths, in order to introduce a regular establishment of steam-boats between Port Dundas and all the eastern ports of Britain, and also all the ports on the western coasts of Britain, and the opposite coasts of Ireland. The original objection of the canal being unfit for steam-boats has already, by the use of the Cyclops, been completely removed. The objection that canal steam-boats would not be fit to navigate the adjacent firths, has also, by the same measure, been proved to be groundless. But it may be, and is, objected that canal steam-boats are not of sufficient breadth of beam to encounter the waves of the open sea, and that the stern-paddles are not adapted for the wide sea navigation. These objections will soon be brought to the test of experiment, when an improved stern-paddle steam boat, fitted to carry goods, will be tried on the canal and seas adjacent. The Committee, however, are well assured that the objection founded on the want of breadth of beam has already been set at rest by the experience of the steam-boats plying from the Clyde through the Crinan Canal to Tobermorry, Skye, and Inverness; the beam of these boats not exceeding 15 feet.

"The committee have now to enter on the third manner of employing steam power on the canal, viz. its application to the conveyance along the canal of passengers and light parcels, at a rapid rate.

"It is here necessary to state, that previous to the year 1830 it was held to be an established fact, that the moving of vessels on canals, with a speed exceeding 5 miles an hour, was unattainable, except at a ruinous expense, by the force of horses; and that, if any higher speed could in any way be attained, it would be utterly destructive of the banks, by the wave and surge thereby occasioned.

"Both these alledged facts have been completely overturned by

experiments first made on the Paisley or Androssan Canal, at the suggestion and under the direction of William Houston, Esq. of Johnston, and subsequently verified and confirmed by similar experiments in the Forth and Clyde Canal. The improvement, so far as hitherto carried into effect, consists in the use of light gig-shaped boats, of considerable length, drawn at present by horses; whereby not only a high speed is easily and cheaply attained and maintained on canals, but all surge or wave is prevented. Various improvements have been made on the shape of these boats in the very short periods since they were introduced, whereby the labour of the horses is diminished; and, by the use of light iron in their build, they are not only rendered much stronger, but their weight is greatly lessened.

"It is needless to enter into any detailed account of the nature and progress of these improvements; it will be sufficient to state the practical result on the Paisley Canal, where the improvements have, for many months past, been carried into actual effect. The result is, that with three sets of two horses each, or in all with six horses, a gig-shaped passage-boat, carrying upwards of 70 passengers, is conveyed between the towns of Johnston and Glasgow, a distance of 12 miles, 4 times every day; and that at a rate of speed upwards of 8 miles an hour, including stoppages to take in and let out passengers at Paisley and elsewhere, and to change horses; or in other words, by Mr. Houston's improved boat 6 horses now convey on the Paisley Canal a boat, with 70 passengers and upwards, an entire distance of 48 miles per day, at a rate, stoppages included, of upwards of 8 miles an hour. The work is besides quite easy, and the horses, after many month's work, are in an improving condition.

"These improvements have been most carefully observed by the committee of the Forth and Clyde Canal, and would long ere this time have been effectually introduced on the Forth and Clyde Canal, had not the committee, at the very commencement, seen the superior advantages of obtaining this quicker speed on the Forth and Clyde Canal by the means of steam power. The Paisley Canal is one of the smallest in Britain, while the Forth and Clyde Canal is one of the largest, and of course much better adapted for the introduction of steam power. The bridges on the Paisley Canal are almost all of stone, under which the dragging horses pass without throwing off their tracking-lines, or any stoppage, while the bridges on the Forth and Clyde Canal are all draw bridges, where the trackling-lines must be thrown off and again attached, which occasions frequent interruptions and considerable delay and fatigue to the horses in bringing up the boat, after a stoppage, to its former speed.

"It was besides quite evident, that it would be more advantageous for the Canal Company to obtain a speed of 7 miles an hour by steam power, than a speed of 9 miles an hour by horses, as the steam power would not cost one-half the expense of the present horse power: so that, without going into any calculation as to the effect of an increase of speed in increasing the canal revenue, or without increasing the charge or fare to the passengers in the boats already established on the canal and drawn by horses, a large disposable sum,

applicable to the increase of the dividend, might be obtained to the Canal Company from the best source, viz. a diminution of the expenditure. With the improved form of light passage-boats drawn by horses, although a great increase of speed is obtained, yet there is no diminution of expense, nor can it be expected that any very great diminution will ever be obtained; for, though the dragging-labour of the horse is diminished by the use of the improved form of boats, this diminution is counterbalanced by the increased exertion necessary to move their own bodies at a high speed; and it is, moreover, hardly practicable to increase the speed beyond 10 miles an hour. The attention of the committee has, therefore, been directed to the application of steam, as a moving power, to the improved gig or canal passage-boat. In the mean time, however, a light improved passage-boat has been started from Port Dundas to Lock No. 16, which is dragged by horses, and does the journey in little more than 3 hours; that is, in about one-half of the time consumed by the present large passage-boats of the old construction, so that the public already enjoy the improvement in speed of the gig-shaped boat.

"In the view of introducing steam, as a moving power, in this third species of its proposed employment, the committee instituted a variety of expensive experiments last year, the results of which appear in the books and minutes of the Company. These experiments were made under the inspection of Mr. Fairbairn, of Manchester, and the committee subsequently entrusted Mr. Fairbairn and his partner, Mr. Lilly, with the construction of a twin steam-boat, which has been named the Lord Dundas, in compliment to the present Lord Dundas, the principal proprietor of the canal.

"After many delays, the Lord Dundas has now arrived in the Forth and Clyde Canal, and a preliminary trial of her speed has been made in the canal, and it is found that she can, with her present engine and outfit, drag one of the quick passage-boats at the rate of 6 miles per hour, to which purpose she will be applied.

"Since the construction of the Lord Dundas, a new improved steam passage-boat has, by the orders of the committee, been commenced by Messrs. Fairbairn and Lilly. This boat has two stern-paddles, so placed as to be defended from contact with the sides of the canal, while the wheels and machinery do not cut up the accommodation of the boat as in a centre-paddle vessel. This boat is to be in the canal in May, and it is expected that the Lord Dundas and this new boat will do the whole duty of the three passage-boats, at present used by the company, at a very great reduction of expense, and with an increased convenience to the public, by a diminution of the time consumed in passing along the canal, without any higher rate of fare.

The committee are resolved not to rest satisfied with any partial improvement in the navigation.—*The improvements made in the last twelve months have satisfactorily proved the erroneousness of the opinions previously entertained on the subject of the limited powers of canal navigation.* To what lengths these improvements can be carried

it is impossible to say; but it would be equally irrational, and contrary to all experience, to presume that more than a mere step has been made in the short period elapsed since the improvements have been attempted.

"The committee particularly look to great improvements in the application of steam power at quick velocities on canals, by means of great lessening in the bearings and weight of the engines. From the nature of the medium on which these engines work, and the entire absence of shakes and jerks, not only the engines, but their framings may, and ought to be made of the lightest description. The improvements already made on the locomotive-engines on the Liverpool and Manchester Railway, in lightening the boilers and machinery, may be all extended to canal steam passage-boats, with the great additional advantage, that the framing may be also much lightened, as they are not subjected to the shocks which must be encountered on the ruder route of the railway or in sea-boats.

"The committee also look to the early adoption or steam as a dragger for sailing vessels on the canal, and expect thereby greatly to increase the general speed of conveyance on the canal, and to reduce the expense or charge to the trader for dragging fully one-half.

"In the various improvements before stated, to which the attention of your committee has been directed, the Proprietors will observe that the accommodation of the traders and the public has been equally considered with the interests of the Canal Proprietors. By the stone-facing and deepening of the canal all the present charge for lighterage will be saved to the traders in the large class of vessels navigating the canal, while the smaller classes will be easier tracked, and enabled at a less expense to convey their cargoes, and at the same time the annual outlays of the canal for repairs will be diminished. By the introduction of a class of steam vessels for carrying goods, on an improved model of the Cyclops, in addition to the port of Alloa (which is already connected with Port Dundas) the other ports on the Firths of Forth and Clyde will be brought nearer to Port Dundas, both in respect to the time and regularity with which the voyage is performed; and, by the extension of the navigation to the sea-coasts. Dundee and some other eastern ports will be brought within a day's sail of Port Dundas, and the other ports on the east and west coasts will be connected with Port Dundas, by conveyances as regular and much speedier than land carriage. In like manner, and without any increase of charge to the parties travelling, the time consumed on the journey along the canal will be greatly diminished, and a saving in outlay effected to the Company. It is quite impossible even to estimate how far the last improvement may be carried. The speed of the passage-boats has already been increased, with a diminution of expense or cost, and this is only the first attempt at improvement. The committee trust that they will be aided in their attempts by other canal companies. The field is ample, and is as yet almost unentered.

AMERICAN PATENTS.

For a Machine for making Shot, and Musket and Rifle Bullets. JULIUS WILLARD, *Baltimore, Maryland, July* 10.

THE machinery referred to in the above title is intended to manufacture balls by first casting, and afterwards condensing them by rolling. Several abortive attempts have been made to manufacture bullets by pressure, so as to condense and equalize them; the failure has not resulted from any real difficulty in accomplishing the object, but from the increase in cost. The present plan exhibits a good arrangement for the purpose, and is very distinctly described. The specification refers throughout to the drawings which accompany it, and without which no more than a general idea of the machinery can be given.

The balls are first cast in moulds consisting of two iron plates, faced so as to fit closely together. The lower plate forming one-half of the bullet, and the upper plate the other half. The thickness of the upper plate is just equal to that of the half bullet, there being a hole through it above each, for the purpose of casting.

These plates are so placed as to form an inclined plane, upon a frame made for the purpose. A hopper to contain lead to fill the moulds, is made to slide over, and in contact with the upper plate, and is followed by a knife which removes all the superfluous metal. The hopper is borne down by a weighted lever, and moved by a rack and pinion.

Upon being turned out of the moulds, the bullets are coated with black lead, to prevent them adhering, after which they are passed through the rolling machine. This consists of small hoppers, into which they are first put, and by which they are delivered on to grooved rollers, properly adapted to them; of these there are five, which they pass in succession, each with the grooves a little smaller than the preceding one; this number, it is said, is found sufficient to render the balls perfect.

The claim is to the general arrangement of the whole of the machinery.

Specification of a patent for an improvement in the ordinary machine for Thrashing Wheat, and other small grain. Granted to JOHN STOWITS, *Gorham, Ontario County, New York*, July 13, 1830.

THE improvement consists in a variation from the thrashing machines now used, in this respect; those now in use are fed near the bottom of the machine, and are so constructed that the main cylinder catches the straw at the *lowest point* in its revolution,

and of course, throws the straw, grain, and chaff upwards: they then fall together in a confused mass; this renders it very troublesome to the person employed in separating the refuse from the grain, and while the machine is in motion the place he must occupy is filled with dust; the velocity of these machines is such, and their power so great, that grain, and even stones, sticks, and weeds will greatly annoy, and sometimes injure the person so employed.

By this improvement all these objections are avoided: a concave piece of wood, filled with teeth of proper size, is placed at the *top* of the machine, and the cylinder also filled with teeth plays into this, and the straw to be thrashed is put on an apron leading to the top of the cylinder—the course of the straw is therefore downward, and it falls on a sieve. A blower in the lower part of the machine, fixed as in the ordinary fanning mills, separates the refuse from the grain. The straws of ordinary length, by the force which they acquire in the revolution, are thrown beyond the main body of the grain. JOHN STOWITS.

Specification of a patent for an improvement in the Railway, intended to be applied to the loading and discharging of vessels, of coal, and merchandise of all descriptions, and the transportation of goods from place to place. Granted to EDWARD DUNSCOMB, *of the City of New York, July* 13, 1830.

THIS new and valuable improvement consists in elevating the railway in such manner that coal may be swung underneath it (by means of a chain attached to the bottom of the rail carriage) and may be thus transported with facility to the place of deposit.

The railway is sustained in a level and horizontal position, and at the required height, by a suitable number of upright posts, and is permanently secured by bolts or other suitable fixture, to them. The lower extremities of these posts are securely imbedded in the ground, and are preserved in their respective positions by means of suitable braces or stancheons.

On the susfaces of the horizontal bars which constitute the bed pieces of the railway, are beds of wrought or cast-iron, or other proper material, which are firmly secured to them, and extend their whole length. These beds are made perfectly smooth and level, to receive the wheels of the carriage, which may be flanched or grooved to move upon them.

The rail carriage consists of a frame constructed of suitable material, to which axles of wrought iron are attached by means of bolts or other contrivance. The wheels may be formed of wrought or cast iron, or other proper substances, and may be made solid or otherwise, with their surfaces either flanched or grooved to move on the beds of the railway, as before mentioned. There

is attached to the bottom of the rail carriage, and suspended from it, a chain, which may be lengthened or shortened at pleasure, having a hook at its termination or extremity for attaching a coal tub.

At one extremity of the railway, and projecting above it, a crane is placed, and secured by suitable fixtures. This crane is supplied with a chain or rope fall, which is used for raising the coal to the carriages, from the vessel, or other place of deposit, and may be worked by horse or other power.

There is constructed, beneath the railway, and directly under the crane, a staying, which is made to slide between the foot, and may be raised or depressed at pleasure by means of pins or bolts, which are adapted to apertures bored in the posts.

The coal is raised to the staging before mentioned, in tubs, by means of the chain fall attached to the crane, where it is disengaged by an assistant, and transferred to the carriage, the chain and hook of which hang directly over the staging.

The carriage is set in motion by means of ropes and pullies, or other machinery, and the coal, suspended in tubs beneath, is transported to the distance, or place required, where it is deposited; the carriage immediately returning with the empty tub.

The subscriber claims the privilege of constructing his improved rail-way of a double form, so as to admit of two carriages moving parallel to each other; in which case the middle or centre horizontal bar, or bed piece, has on its surface, beds for the inner wheels of both carriages, on which they move, as before mentioned. The crane in this case is placed in the centre, and is enabled to serve each carriage in succession by swinging two ways.

He also claims the sole privilege of applying his improved rail-way to the loading and discharging vessels of coal, and merchandise of all descriptions, and transportation of goods from place to place.

E. DUNSCOMB.

Specification of a Patent for a Rotary Pump, to be used for the raising or forcing of water and other liquids. Granted to EBENEZER R. HALE *and* CHARLES LAZAREME BELL, *of Hyde Park, Dutchess County, New York, July* 14, 1830.

Two wheels are constructed, one of them having, on its periphery, floats or wings, three in number, (more or less) at equal distances apart, and something in the form of cogs; the other said wheel having a cavity or cavities, (depending upon its size) in its periphery, into which cavity or cavities may fall the wings or floats of the wheel afore mentioned, they being placed in a manner to revolve together, and when so placed, their peripheries are intended to come in close contact, so as to form a water joint.

The above described floats are an inch and a half in length, and three in breadth, (more or less,) or the thickness of the wheel or hub on which they are; which thickness, as well as the length of the floats, should be in proportion to the diameter of the wheel on which they are, and the quantity of water, &c. they are intended to raise or force.

The two above described wheels are enclosed in a casing corresponding with the size of the wheels, which casing fits closely upon the sides of the wheels, and upon the pheriphery of the one having the cavity or cavities as aforesaid, and equally close on the outer extremities of each wing or float, in each and every part forming water joints; to effect which it may be packed with leather, or other suitable material, in such places as may be found necessary. Through the ends or heads of the above described casing, pass the shafts which support the two wheels before specified, on, and with which they are made to revolve.

The gudgeon boxes are made in such a manner as to admit of packing, which packing generally consists of cork. Upon the shafts just mentioned, and on the ends which project through the end or head of the casing, are toothed wheels; they are of such a size as will cause the wheels within the casing to revolve in such a manner as to bring the floats of the one into the cavity or cavities of the other, which said fronts are fitted or packed so as to form a water joint while revolving and within the cavity or cavities of the wheel afore mentioned. To the casing which contains the wheel, and on or near to the periphery of the same, are two passages or apertures, to each of which a pipe may be attached, one for the supply and the other for the discharge of water, &c.; the passages to which are the pipes, enter the casing as near as is convenient to the wheel within, having in it the cavity or cavities aforesaid, one of them being upon each side of the same; or the place for the discharge may be varied, provided it be placed from the supply passage a distance not less than the space between two floats or wings. The pump may be put in motion by hand or other power; the water, &c. is drawn in by suction, produced by the motion of the floats as they recede from the wheel in which is the cavity or cavities: it is discharged in like manner by their motion as they approach the discharge passage. This pump is subject to variations: it may have two places for supply, and two for the discharge; this may be done by placing another wheel having in it a cavity or cavities similar to the one above specified, on the opposite side of the wheel, upon which are the floats, and gearing it with that wheel in such a manner as to give to it the necessary motion for bringing the wings or floats of the one, into the cavity or cavities of the other. The above specified floats or wings may be attached to the wheel by forming a notch or mortise, in the wheel from the periphery, in a line to the centre, of the same thickness of the float, and one inch in length (more or less;) in this notch or mortise, is placed one end of the float, leaving

the other end projecting a suitable distance from the periphery of the wheel. A *screw and nut*, or a *wedge*, or *spring*, is also fixed in the bottom of the said mortise or notch, for throwing the wings or floats out from the wheel, as occasion may require, for the purpose of keeping a close joint between them and the casing.

That which I claim as my invention and improvement, is, having the floats which project from the periphery of the wheel, and which act as buckets, *stationary*. And also the application of the revolving block, or wheel, in which is the cavity or cavities to the rotary pump; the placing and revolving these wheels together, as above specified, for the above mentioned purposes.

EBENEZER R. HALE,
CHARLES LAZAREME BELL.

Reference to Drawing at fig. 3, *Pl. IX.*

A, the wheel, having upon its periphery, floats or wings.

B, small wheel, having in it a cavity or cavities to receive the floats.

C, C, C, the floats, wings, or fans.

D, D, D, the casing which encloses the wheels.

E, E, the shafts or axles.

The passages for the supply and discharge of water, are shown by the bent arrows.

The axes of A and B are connected together by toothed wheels on the outside of the box or case, to insure the passing of the floats into the cavity in C.

Specification of a Patent for an improvement in the mode of making Paper for Writing, Printing, Wrapping and Boards, from Wood. Granted to LEWIS WOOSTER *and* JOSEPH E. HOLMES, *Meadville, Crawford county, Pennsylvania, August* 3, 1830.

BE it known that we, the said Lewis Wooster and Joseph E. Holmes, have invented, constructed, made and applied to use, a new and useful improvement in making or manufacturing paper for writing, printing, wrapping, and boards, from wood; the preparation of which, for making the paper in the common paper mill, is as follows, viz. The wood is reduced to shavings of the ordinary jack-plane shaving size, or bruised so as to be rendered of nearly the same size of the shaving; they are then placed in a cistern or boiler, of sufficient dimensions, and covered with water which is put to a boiling heat. To every one hundred pounds of the wood (thus reduced) put from twelve to eighteen pounds of alkali, either vegetable or mineral, in proportion to its quality for strength. If salts are used, they should be reduced before

they are placed on the wood in the cistern or boiler, with the water; they may, however, be put in with the water and wood before reduction, but the first mode is found the most preferable. Should lime be used, there must be a sufficient quantity in all cases to equal twelve pounds of pure black salts. For every one hundred pounds of wood, which may be leached before being placed in the cistern with the wood and water, or thrown in, in its pure state. One hundred pounds of wood, will, if well attended to, make from five to seven reams of paper.

LEWIS WOOSTER.
JOSEPH E. HOLMES.

Specification of a Patent for an improvement in the manufacture of Paper, by means of a machine called a "Pulp Dresser." Granted to ELIHU H. THOMAS *and* NATHAN WOODCOCK, *Brattleborough, Windham county, Vermont, August* 11, 1830.

THIS improvement consists of a box about two feet square and one foot deep. Inside of the box, near the bottom, is placed a *hog* or *float wheel*, or agitator, about 7 inches in diameter, and as long as will play freely inside of the box. One end of the hog shaft passes through one side of the box, and receives a pulley which is conected with some moving power, so that a rapid motion is given to the hog. Directly on one side, and nearly over the hog, is placed a sieve or screen, on an angle of about 45 degrees, with apertures so fine that knots and other offensive particles cannot pass through; but with the agitation caused by the hog, the pulp is allowed to pass freely when diluted with water.

A partition of board is placed on the opposite side of the hog, much like the screen; the tops of the screen and partition are united together when in use, in such manner as the pulp shall not get through between them. The partition reaches within about two inches of the bottom of the box; the pulp flows in at one end of the box, and passes under the partition, is then washed through the sieve or screen, and flows out at the opposite end of the box through an aperture.

The sieve, or screen, is made of triangular bars of metal, about one-fourth of an inch in width on each angle; these bars are made straight and true, and placed near enough to each other to prevent coarse particles passing through the apertures.

These bars may be made circular, and placed perpendicularly or horizontally, with a revolving or vibrating hog, which we conceive to be our principle.

We do not claim as our invention, the hog or agitator, for mixing and giving motion to pulp in the manufacture of paper, nor of the common engine for grinding rags into pulp. But we claim the discovery of applying the hog and common engine to the purpose of forcing the pulp through the apertures of a screen

or sieve, for the purpose of separating knots and filth from the pulp.

ELIHU H. THOMAS.
NATHAN WOODCOCK.

NATIONAL REPOSITORY,

CHARING CROSS.

WE resume our notices of the Improved Productions contained in the above-mentioned gallery.

Model of an Improved Paddle Wheel.—By Mr. J. MURDOCK, *of* 49, *Hunter Street, Brunswick Square.*

WE entirely agree with the writer of the Catalogue, who observes—"Amongst the multitudinous expedients for adjusting the angular position of the floats of paddle-wheels, on immersion and emersion, this is an elegant and ingenious one. But the numerous cultivators of this prolific field of mechanical ingenuity, for the most part overlook the fact, that for a vessel progressing through the water the fittest positions for the entering and quitting floats are at angles oppositely inclined to the surface of the water, and which angles will call for variation with the varying velocity of progression. Under this view it will be manifest that, with a diameter adjusted to the average speed of the vessel, the radial position of the floats upon the wheel will be as nearly as possible that in which the floats, before and after the moment of effective action, will interfere least with the advance of the vessel through the water. Conjoined with this approximation to theoretic truth, the simplicity and solidity of structure of the common paddle-wheel give it incalculable advantages in practice over more complex structures, when we take account of the powerful resistance and rude shocks which the machine must every moment encounter.

"Mr. Murdock has, in the present instance, obtained a pretty mechanical movement by a modification of the original contrivance published by Mr. Robertson Buchanan, in which he availed himself of the fact that the ties connecting the peripheries of two wheels eccentric to each other during a revolution maintain their parellelism with the line which passes through the two centers:" But this arrangement is productive of the serious disadvantage of causing the paddles entering and leaving the water, to move through the horizontal line of direction at a speed greatly reduced and varying from those which are deeply immersed, tending to counteract the propelling effect of the latter, and retard the boat. Instead therefore of fixing the floats on spindles, the ends of which are the places of attachment for the ties with the eccentric, Mr. Murdock swivels them on points intermediate betwixt the

attachment of the ties, and they take their angular direction from guide-pins in the eccentric, playing in forks or loops fixed at right angles on the extremities of the float spindles. Under this arrangement the floats are only vertical at the two points of the revolution when their centres coincide with the line passing through the centres of the eccentrics, and the paddles which are immersed, move with *equal velocity* through the water.

At fig. 1, Pl. X, is given a side elevation of the apparatus, as viewed from the inside. *a a a* being antifriction rollers turning on axes fixed to the side of the vessel, and supporting the guide wheel or eccentric *b b b*, in the periphery of which are studs at *c c c*, that pass through the mortices or loops in the levers *d d d*, fixed at right angles to the extremities of the spindles of the floats *e e e;* these last are placed as usual between a pair of wheels, (whose axis is at B) and are distinguished in the drawing from the eccentric motions by being shadowed, the other parts being left white. The straps for the parallel motion, which connect the guide wheel to the paddle wheel, are shown at *f f f*.

The proper point for the studs is thus ascertained. "Draw the paddle wheel and guide wheel with the radii parallel, then bisect the horizontal radius *A B* of the paddle wheel, and the quadrant *A C* of its circumference; through the points of intersection draw a right line, to cut the radius *E F* of the guide wheel, and it will give the position of the stud on that arm, and the other studs will of course be equidistant from the centre of the guide wheel."

A Case of Artificial Eyes.—By JAMES GRAY, *No.* 1, *Shoreditch.*

THESE are such acccurate resemblances of nature, that a person having only one eye, may have it matched with an artificial one, with all the pencilling, coloring, and veiny streaks of the genuine one, as to be hardly detected when they are both in on the same position. The manufacturer says, that they occasion pain in the fixing, or wearing, and that "their only fault is, you cannot see with them," which is truly a defect of such trifling consequence in *eyes*, as not to be worthy of notice.

The eyes manufactured by Mr. Gray, for other animals, including birds, reptiles, and fish, are equally good copies of nature, but they are used differently, being put into the animals after they are dead, at which time, Mr. Gray says, they can see equally well with them, as with their natural eyes!!

A Tube for introducing a fluid, drop by drop, into the eye, or a decayed tooth.—By Mr. LEVISON, *Dentist, Gower Street, North.*

THIS little instrument is of blown glass, of the figure repre-

sented at fig. 5, Pl. X.; the bulb *a* is to be filled partly with the fluid intended to be introduced into the eye or tooth, and being held in the hand, the heat therefrom expands the air above the fluid and expels the fluid through the capillary orifice *guttatim*, at *b*. The application of this instrument for various other operations, will be found of great convenience.

Picture of Organised Nature as extending over the Earth.—By SMITH & SON, 172, *Strand.*

MESSRS. Wilbrand & Ritgen have in this small space assembled a vast number of facts of the naturalist. In one collective view we are shown the local habitation and range of distribution of the several tribes of organic beings, animal and vegetable, over the surface of our planet. These bird's-eye glances over the various departments of natural knowledge, many of which have been given of late years, conduce greatly to the consolidation of the student's acquirements, and lead him, perhaps, by the shortest path, to the formation of general and philosophic views of nature. Reference to the small tract published with the picture soon points out the great mass of information which is conveyed in it by exceedingly simple means, yet with the utmost perspicuity and fidelity doubtless to the observations of natural historians, the labour of collecting which from their numerous volumes is at once spared by this graphic display.—*Catalogue.*

Specimens of Terra Cotta, for Flooring.—By JAMES BAGSHAW, *Duchy Wharf, Savoy, Strand.*

THE flooring squares newly introduced by Mr. Bagshaw have certain advantages over stone for similar purposes, inasmuch as the artificial substance is a less perfect conductor of heat and will consequently make a warmer flooring than stone; and besides having less tendency to absorb moisture from the ground or from the atmosphere, there is less liability to be exposed to the annoyance or danger of a damp floor. By covering one or both surfaces of these squares with a fire glaze, which can easily be done, they will form an effectual preventive against the rising of damp in the lower floors of buildings. Variations in the colour and form of the squares will make them subservient to ornament, in the flooring of halls, passages, and common rooms. For ornamental floors the artificial slabs can be used more economically than Portland stone. These are made in a great variety of forms, though generally square, or squares bisected into triangles, as they are more easily adapted to the general figure of apartments. The cost is about thirteen shillings and sixpence the superficial yard.

Specimen of Prepared Parchment.—By C. TERRY, 5, *Shoe Lane, Fleet Street.*

THE mode of preparation here adopted has been submitted by the inventor, by desire of the Lords of the Treasury, to a committee of eminent chemists, who pronounce very dicidedly on its excellence. It is very apparent, that many of the imperfections existing in parchment prepared according to the ordinary method are in this specimen removed. The surface is uniformly smooth, and the ink flows freely upon it, and by the report on the process, there appears to be nothing in it calculated to impair the durability either of the material or of the writing."—*Catalogue.*

A Picture, painted in Copal.—By CORN. VARLEY, *Charles Street, Somer's Town.*

To avoid the injurious effect to colours arising from the change which takes place in oil used as a vehicle as it becomes oxygenated by the atmosphere, Mr. Varley has substituted a solution of copal in oil of turpentine, with which to incorporate the dry pigments. The oil of turpentine evaporating, leaves the colouring matters coherent, only by a portion of the resinous copal, which is susceptible of but very slow change from atmospheric influences, and hence we may argue greater durability in the picture.—*Ibid.*

"*Union Cup,*" *for taking effervescent Draughts.—By* GEORGE TYRERS, 17, *Coppice Hill, Liverpool.*

THIS cup, which is represented at fig. 5, Pl. IX, is divided interiorly by a partition into two equal chambers, *a* and *b*, into which the alkali and acid are to be separately put, or distinct solutions of them, which will perhaps be more convenient; in drinking the contents, the person places his mouth to that part of the edge of the cup *c* where the partition is situated, so as to drink the separate fluids together, which will mix and effervesce in his mouth and stomach, and be more potent in its effects than when such draughts are suffered to effervesce chiefly in the cup. Not having drank out of Mr. Tyrer's cup, we cannot speak positively of its effects, but we should suppose that the separate tastes of the alkali and the acid must be disagreeable, and that a fit of coughing would be a common result.—The name given to it, *Union* cup, is whimsical enough, unless it should happen that Mr. Tyrer has been taught, that *to unite*, is *to divide.*

Silver Ear Tubes.—By Mr. CLUELY, *of Sheffield.*

THESE little instruments are of the size and shape drawn at fig. 6, Pl. IX., and are to be worn inside the ear, the little tube

a being placed in the auditory passage. We understand that they have been used with much success; and their superior convenience must, in that case, render them a valuable substitute for the common ear-trumpet.

Substitute for the Ball Cock in Cisterns.—By WILLIAM BECK, 3, *Wood Street, Spitalfields.*

MR. Beck places on the external axis of the plug of the cock, (as shewn at fig. 2, Pl. X.), a small wheel *a*, having cogs extending over about one half its periphery; these cogs take into similar teeth in a vertical rack *b*, at the bottom of which is the float *c*, which as it rises or falls by the level of the water, operates through the medium of *c* and *b*, and opens or closes the cock. This apparatus will be found useful in situations where there is not sufficient space for the usual horizontal lever and ball-float. Mr. Beck's apparatus is however not new, and we think it would be improved, by substituting for the toothed rack and wheel, a stud and slot mortice; it would cost less, be quite as original, and produce less friction.

MISCELLANEOUS.

ENORMOUS WHALE.—The skeleton of the whale now exhibiting at Charing Cross, is *correctly* stated in the hand bills respecting it, to be of the following dimensions in French feet, to which we must add $\frac{6.394}{10000}$ to bring them into English feet.

	French feet.
Total length of the animal	95
——— of the head	22
——— of the tongue	20
Height of the cranium	4½
Length of the vertebral column (The vertebrae are 62 in number)	69½
Length of the ribs (28 in number)	9
——— of the fins	12½
——— of the fingers	4½
Width of the tail	22½
Length (in the line of the vertebra)	3

The weight of the animal when taken, is stated to have been 480,000 lbs.; of the oil 40,000 lbs.; of the flesh buried in the sand 170,000lbs. The upper jaw contained 800 *fanons*, or whalebones.

From the calculations made by Monsieur Le Baron Cuvier, and the Professors of the King's Garden, this enormous cetacious animal must have lived nine or ten centuries." It was found on the 3rd of November, 1827, floating in the north sea between

Belgium and England, and was towed by fishermen's boats to the shore near the harbour of Ostend, where the preparatory operations were made, employing sixty men for a considerable period of time. It has already been exhibited in several parts of the continent, and is considered by naturalists as the largest in the possession of man.

SPEAKING PIPES.—The mainmast of the Briton is fitted with a tin pipe, for the conveyance of the voice in boisterous weather from the quarter-deck to the main-top. The pipe is about one inch in diameter. It was a proposition of Mr. Parsons, of this dock-yard.—*Hamp. Telegr.*

LIST OF NEW PATENTS SEALED.

DISTILLING.—To W. G. Kneller, of Hackney, Esq. for improvements on stills, or apparatus for distilling.—Dated June 29, 1831.—Specification to be enrolled in six months.

BOILERS.—To J. Perkins, of Fleet Street, engineer, for improvements in generating steam.—July 2, 1831.—Six months.

SHEATHING SHIPS.—To B. C. Wetterstedt, of Whitechapel Road, Middlesex, for a combination of materials for sheathing, painting, or preserving, ships' bottoms, and for other purposes.—July 6, 1831.—Six months.

CULINARY APPARATUS.—To R. Hicks, of Wimpole Street, surgeon, for improvements in culinary apparatus.—July 8, 1831.—Six months.

PRINTING.—To A. Jacquesson, of Leicester Square, for improvements in machinery applicable to lithographic and other printing. Communicated to him by a foreigner.—July 9, 1831.—Six months.

SPINNING.—To J. Milne, of Shaw, in the parish of Oldham, cotton-spinner, for improvements on certain machines, commonly called roving frames and stubbing frames, used for preparing cotton wool for spinning.—July 13, 1831.—Two months.

NAILS.—To R. Prosser, of Birmingham, civil engineer, for improvements in manufacturing nails or tacks, for ornamenting boxes and other articles of furniture.—July 13, 1831.—Two months.

FIRE ARMS.—To A. Demondion, of Old Fish Street Hill, London, for improvements on guns, muskets, &c. and in cartridges to be used therewith, and in the method of priming the same. Communicated to him by a foreigner.—July 13, 1831.—Six months.

PROPELLING.—To M. Poole, of the Patent Office, Lincoln's Inn, gentleman, for improvements in steam engines, and in propelling boats, and other floating bodies. Communicated to him by a foreigner.—July 13, 1831. Six months.

STOVES.—To J. Pycroft, of Rolleston, near Burton-on-Trent, gentleman, for improvements connected with grates, and other fire-places.—July 13, 1831.—Six months.

CABLES.—To W. Batten, of Rochester, gentleman, for an apparatus for checking or stopping chain cables, and which may be applied to other purposes.—July 13, 1831.—Six months.

PENS.—To S. Mordan, of Castle Street, East Finsbury, engineer, for improvements in writing and drawing pens, and pen-holders, and in the method of using them.—July 13, 1831.—Two months.

FIRE ARMS.—To J. de Burgh, Marquis of Clanricarde, for improvements in fire arms, and in the projectiles to be used therewith. Communicated to him by a foreigner.—July 15, 1831.—Six months.

To CORRESPONDENTS.—We will mention to our *locomotive* friends the subject of Mr. DALTON's letter.—Mr. A. A. Gomes's will receive our earliest attention.

PATENTS ENROLLED BETWEEN 10TH JULY, AND 10TH AUGUST, 1831.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

STEAM BOILERS.—To Samuel Seward, of the Canal Iron Works, Poplar, Middlesex, Engineer, a patent for "improvements in apparatus for economising fuel and for other purposes, and the application thereof to the boilers of steam engines employed on board packet-boats and other vessels," was granted on the 15th of January, and the specification was lodged in the Enrolment Office on the 15th July, 1831.

The economising of fuel is proposed to be effected by this patentee through the medium of the waste steam which escapes from the safety valve of boilers on board of steam vessels, whenever the steam is generated faster then required for working the engine, or when the engine is not required, while the steam continues to be generated. The principal use proposed to be made of the waste steam, is to heat the water nearly to the boiling point before it is supplied to the generator: and this is effected by a feeding vessel situated either immediately above or at some convenient place of greater elevation than the boiler, and connected with it by two pipes; the one extending from the upper part of the feeding vessel to the upper part of the boiler, to constitute a steam communication between the two, and the other extending from the lower part of the feeding vessel to the lower part of the boiler, to constitute a water communication. A third pipe extends from the feeding vessel into the water on the exterior of the boat, and a fourth pipe extends from the feeding vessel to the hold, to form a communication with the bilge water. Each of the pipes is furnished with a stop-cock, that the communications may be opened or closed as occasion may require.

The arrangement of the different parts of this invention will be readily understood by inspecting fig. 2, Pl. XI., where *a a* represent a portion of a steam boiler, *b b* the feeding vessel placed over it, *c* the stop cock in the pipe which forms the steam communication, and *d* that in the pipe which forms the water communication between the boiler and its feeder: *e* is the stop-cock and pipe which communicates between the feeder and the water in which the vessel floats.

Now the action of these parts of the apparatus is as follows:—When the waste steam escapes at the safety valve, the cock *e* is

to be opened, and the feeder will be immediately filled with steam, while the air previously occupying it is permitted to escape by opening the cock *g*. The feeder being thus filled with steam, the cocks *c* and *g* are to be closed and the cock *e* opened, when a condensation of the steam in the feeder will take place, and water will ascend through the pipe *e* to fill the vacuum, and receive all the heat of the steam in the feeder, which it condenses as it enters. The cocks *d* and *c* are then to be opened, and the water will descend to the boiler through *d*, while steam ascends through *c* to occupy its place. This being effected, the apparatus is in a condition to receive a second dose of water, which is to be discharged into the boiler as before.

The other purposes alluded to in the title of this invention, consists in the application of the same apparatus to the pumping of ships, when necessity requires such an operation; and to make it available for this purpose, the pipe *f* is introduced, that the bilge water may ascend through it to fill the vessel *b b*, when it is rendered vacuous by the condensation of the steam which it receives through *c*, which must be closed during the passage of the water from the hold to the feeder, and opened again when the feeder has been emptied through *e*, which must be opened for the escape of the water, while *d* is closed to prevent its descent into the hold again, and *g* opened to admit the pressure of the atmospheric air upon the surface of the water in the feeder. It is evident, that by this means, great quantities of water may be removed from the hold of a ship with much facility; but of the other part of the invention, we unfortunately, cannot speak so favourably, for it is very similar in principle to a plan for feeding steam boiler, patented by Mr. William Taylor, of Wednesbury, Staffordshire, on the 19th of July, 1830, and described at page 293, of the 5th volume of the present series of the *Register of Arts*. Indeed, Mr. Taylor's invention is greatly superior in one respect, inasmuch as it is rendered self-acting; the stop cocks of the steam and water pipes being connected with a regulating float within the boiler.

This one is amongst the numerous instances which we have had occasion to notice, of the inifference of patentees to the inventions of others having similar objects in view.

LACE.—To William Sumner, of Hose, Leicestershire, a patent for "improvements in machinery for making lace," was granted on the 3rd of February, and the specification was lodged in the Rolls Chapel Office on the 3rd of August, 1831.

The machinery explained under this specification could not possibly be intelligibly described without reference to very elaborate illustrative drawings, occupying a space which the majority of our readers would think better devoted to subjects more generally useful. We will, however, for the information of "all whom it may concern," give an outline of its object and operation.

The patentee describes several novel pieces of machinery, and the mode of adapting them to that peculiar kind of lace-making apparatus called a Lever's-machine; and the object is to enable the said Lever's-machine to make "fancy net or bullet-holing" arranged in a variety of patterns. The improvements are described under three several heads, namely:—

First, a mode of "shogging" (which being interpreted, means *shifting*) laterally at intervals, certain positions of the combs, by means of an indented wheel acting against a sliding bar, on which these shifting portions of the combs are mounted.

Second, a mode of "shogging" laterally certain of the pushers at intervals, corresponding with the movements of the combs above-mentioned; in order to bring the said pushers into, or out of action, at those times.

Third, the adaptation of a tappet or cam-wheel to shog or shift the point bar in accordance with the other movements.

The operation of some of these parts very closely resembles the ordinary mode of forming selvages between the narrow strips of lace called breadths, when made in a Lever's machine; except that instead of the large spaces between the selvages, which are connected together by a zig-zag thread, the movements of the machinery cause the threads to traverse occasionally to reduce the spaces forming the open parts of the net, and in making them apparently into circular holes.

SUBSTITUTE FOR TEA.—To Richard Abbey, of Walthamstow, in the county of Essex, Gentleman, a patent was granted on the 21st of Febuary, 1831, "for a new mode of preparing the leaf of a British plant for producing a healthy beverage, by infusion," the specification of which was enrolled in the Petty Bag Office on the 18th of August, 1831.

The specification informs us, that the British plant in question is the *hawthorn*, from which the leaves may be taken from the months of April to September inclusive; they are first to be carefully picked and cleansed, then to be well rinced in cold water and drained; and whilst in the damp state, they are to be put

into a common culinary steamer, where they are to be subjected to the action of the vapour until they change from a green to an olive colour; the leaves are now to be taken out and dried upon a "hot plate well heated," and be continually stirred up and turned over until they are thoroughly dry, in which state they may be preserved for use. When required for that purpose, an infusion is to be made in the same manner as tea or coffee, and sugar and milk, or cream are to be added to suit the taste of the drinker.

The foregoing is the whole of the specification, and nearly in the words of the patentee. We were at first a little surprized to find that the plant was the *hawthorn*, knowing that the leaves have for many years past been employed by poor people (and possibly by the rich too, though unknown to them) as a substitute for the expensive Chinese herb; and we have heard some persons say, that it is "a very good substitute," while others declared it to be "filthy stuff, and nothing like China tea." Our experience, unfortunately, does not enable us to give any testimony on this point, but we are inclined to think, that both sides may be right,—though they differ as widely as the Pilgrims who did penance by making a journey with peas in their shoes; like that pilgrim who boiled his peas, the contented tea-drinker might have boiled or steamed his hawthorn leaves, and thus have got rid of the mawkish flavour probably arising from the fresh unprepared leaves.

There is another circumstance however which makes us augur very favourably of the present proposition, which is, that the gentleman who has patented it was formerly, we believe, extensively engaged as a wholesale tea-dealer; and thoroughly understanding the subject, as he necessarily must, it is not likely he would propose any other than a tolerably good substitute for tea; besides, it is well known, that the Chinese tea undergoes a series of processes to prepare it for use.

The peculiarity of Mr. Abbey's process, on which his patent claim is founded, we must consider to be the *steaming of the leaves*, and we most sincerely hope it may lead to the use of indigenous plants, and to the extended employment of our rural population, instead of our depending upon the "Celestial Empire" for supplies.

GAS.—To J. Spinney, of Gloucestershire, Gas-Engineer, a patent for his "improvements in apparatus for manufacturing gas for illumination," was granted on the 4th of June, and the specification was enrolled in the Rolls Chapel Office on the 4th of August, 1831.

The improvements proposed by this patentee are represented by fig. 1, Pl. XI., and consist of a moveable hydraulic valve for stopping at pleasure, the communications between the generating retorts and purifying vessels. This is intended as a substitute for what has been denominated in gas works the *hydraulic main*, which consists of a cast-iron pipe of considerable diameter, about half filled with water, into which the ends of the pipes which convey the gas from the retorts as it is generated, are inserted, with the view of preventing the return of the gas from the pipes leading to the purifying vessels when any of the retorts are opened to be cleared out and refilled. This security is obtained by making the pipes from the retorts descend from a considerable altitude, perpendicularly into the water in the main; and hence they are denominated *dip pipes*, as the pressure of the gas would have to overcome the weight of a column of water equal to the perpendicular altitude of the dip pipes before it can return to the retorts. Now Mr. Spinney's substitute for this method of preventing the return of the gas consists, as represented, of a cylindrical valve box attached to the pipe *a*, leading from the retorts and extending some distance within the box, where it is surrounded with water *c*. Over this is suspended by means of a rod passing through a stuffing box at the top of the valve box, an inverted vessel *b*, which is made by a lever attached to the rod, to descend over the top of the pipe *a* into the water and prevent the return of the gas. *e* is the pipe which conveys the gas to the purifying vessels, where its manufacture is completed by the usual process.

AXLES OF RAILWAY CARRIAGES.—To R. Stephenson, of Newcastle upon Tyne, Engineer, a patent for "an improvement in the axles and parts which form the bearings at the centres of wheels which are to travel upon edge railways," was granted on the 11th of March, and the specification was deposited in the Enrolment Office on the 11th of July, 1831.

In order to produce rotation in the wheels, and consequently progression of locomotive carriages, it is necessary to fix the wheels on the ends of the axles, and when this fixture is effected in the usual manner, the weight of the carriage and its contents

is supported by concave bearings resting on the upper surfaces of the cylindrical ends of the axles, and hence arises a difficulty in keeping the rubbing parts constantly lubricated, as the oil supplied to the parts in contact will have a tendency to escape by its gravity to a more open space on the lower side of the axles; and the consequence of this is, considerable waste of oil, with an imperfect lubrication.

To remedy this, Mr. Stephenson proposes to employ for each pair of wheels, a double axle, consisting of a hollow casing, on the extremities of which the wheels are to be firmly fixed, and a solid axis passing through the hollow casing, and supporting on its ends the weight of the carriage, through the medium of hollow bearings attached to springs of the usual construction, which connects the bearings with the side rails of the carriage, placed necessarily on the outside of the wheels. Thus the supporters or wheels being fixed to the concave parts of the bearings, and the supported weight or carriage being connected with the convex or solid part of the bearings, the oil will have a tendency by its gravity to accumulate on the rubbing parts, and thus combine a perfect lubrication with an economical supply of lubricating material.

The solid axles are made thickest near their extremities, that the parts which pass through those portions of the hollow axles which are fixed into the naves of the wheels, and at the same time the apertures of the corresponding parts of the hollow axles are diminished, both being turned perfectly cylindrical, that they may be fitted together with facility, and come into contact only where the bearings are intended to take place.

Boiler.—To S. Dunn, of Southampton, Engineer, a patent for "improvements in machinery for generating steam," was granted on the 21st of February, and the specification was deposited in the Rolls Chapel Office on the 20th of August, 1831.

These improvements consist in a certain mode of applying gas lamp burners in the interior of a circular vessel containing water; the mechanical arrangements we will at once describe, with reference to fig. 3, Pl. XII., which represents a vertical section of the apparatus. The boiler charged with water is shewn by *a a*; it has a jacket *b b*, the space between which and the boiler forms a flue leading to a central vertical tube *c* which constitutes the chimney; the hole represented at *d* underneath is the orifice of the steam pipe which opens into the steam chamber.

A series of large tubes *eeeee* open at their bottoms and closed at their tops, are posited vertically over the circular area of the boiler; the bottom plate of which has a series of holes corresponding with the number and dimensions of the tubes, and the latter are fixed thereto by any suitable means. The gas is introduced by the pipe *f*, to which are fixed the burners *g g g g g*; and to each of the glass chimnies of the burners is closely fitted a metallic tube *(h h h)* placed inside the large tubes *e e*, with an annular space between them: the current of heated air being therefore conducted from the burners up the small tubes, is returned by the caps of the large external tubes downwards through the annular spaces *i i i*, to the underneath part of the boiler; proceeding therefrom it ascends the annular space between the outside of the boiler and the jacket, and enters the chimney. To prevent the loss of heat by radiation, the apparatus is surrounded with non-conducting materials, as sand or charcoal, shewn at *k*.

The patentee proposes another and very inferior modification of this apparatus in his specification, and concludes with a declaration of his claim to invention, which consists in every application of ignited gas, through the medium of vertical tubes, to the interior of boilers for the generation of steam. In making this claim, we think Mr. Dunn has been badly advised: we should have recommended him to limit his right of invention to his peculiar modification of that kind of boilers, which may be considered a class from the variety that have already been made.

PROPELLING.—To Andrew Smith, of Princes Street, Leicester Square, London, a patent for "certain improvements in machinery for propelling boats and other vessels on water, &c.," was granted on the 22nd of January, and the specification of the invention was deposited in the Rolls Chapel Office on the 22nd of July, 1831.

Instead of the paddle wheel, Mr. Smith proposes to employ a series of two or more propellers placed in succession one after the other in a recess made in the vessel near her stern; the after part being made double to constitute a paddle channel, on each side of which is placed a helm, both being united to the same tiller for steering. For each paddle or propeller a cranked axis extends across the vessel, and upon this axis the middle two side frames of the propeller is fitted, so as to turn with facility; their lower ends being connected together by an iron plate constituting the leaf of the paddle, while their upper ends are connected by a cross-shaft

or axis furnished with anti-friction rollers on its ends. These anti-friction rollers move in curved guide grooves, by which the position of the paddle in the water is so regulated that the leaf of the propeller, which is made somewhat curved, in the form of a hand partially closed, may enter the water without splashing, and leave it without lifting up with it a great quantity of water.

Another modification of this apparatus is described, by which the position of the propellers is regulated by means of radius rods connecting their upper ends with a stationary axis on which the radius rods turn, in the manner patented by Mr. Stevens, of Plymouth, and described in vol. ii. of the new series of the Register of Arts. We cannot but express our astonishment and regret, that a man of Mr. Smith's ingenuity, residing in London within reach of every facility for obtaining information, should have diminished the effects likely to arise from his own patent, by the appropriation of the invention of another patentee.

Mr. Smith's propellers are connected together by rods joining cranks on the ends of the axis of each propeller, by which the motion of all is rendered simultaneous; but the position of the cranks is so arranged that the propellers shall enter the water in succession, that one or more may be at all times in action: and the length of the cranks are adjusted to each other in such a manner, that each propeller in succession shall move faster through the water than the one immediately before it. The object of this is, that the after paddle shall produce the same propelling effect in water in motion as its predecessor did in water comparatively still. This is evidently an ingenious arrangement, and we believe Mr. Smith to have been the first to propose it.

From the form of Mr. Smith's paddles, and their position in entering and leaving the water, but little agitation will be produced, and consequently but little power wasted: and to render this plan still more eligible for canal navigation, the patentee proposes to project from the stern of the vessel a kind of temporary channel, to keep the agitated water in a line with the vessel's motion, till the agitation had nearly subsided. This channel is made of two rectangular pieces of strong sail-cloth, or other suitable material, attached to two ropes, one extending from each side of the vessel's stern. To each of these ropes is fixed, by the middle, a series of rods, with cork floats at one end, and leaden weights at the other, to keep them in a vertical position. The sides of this canvas channel are connected by cross ropes at several places, to prevent them from being separated too far by the force

of the water between them: and when not required, they are to be rolled upon cylinders, or otherwise disposed of within the vessel.

PRINTING MACHINE.—To R. Winch, of Gunpowder Alley, Shoe Lane, a patent for "improvements in printing machines," was granted on the 29th of January, and the specification was deposited in the Enrolment Office on the 29th of July, 1831.

The improvements in printing machines contemplated by this patentee, are of considerable importance, as they effect a considerable diminution of the quality of alternating matter by which economy of power and a saving of repairs are likely to result.

The type form is made to rest stationary, while the inking rollers are made to traverse forwards and backwards over it, receiving their supply from a ductor roller and then passing over a distributing table, on which they have an end as well as a rotatory motion, that the ink may not accumulate upon them in ridges, and they deliver the ink upon the types both in passing forwards and backwards. The frisket is attached to a slight traversing frame, which is furnished with a series of tapes, on which the paper is laid, so that the tapes may come in contact only with the spaces between the pages.

This frisket frame moves upon an iron rail-way, and having received a sheet of paper to be printed, it is run in till it comes over the types and under the platten; being preserved at a little distance from the types by spring supports which is liberated by pieces projecting from the platten, and yields to the pressure of the platten when brought down to give the pressure. The frisket frame is furnished with conical steady pins, with small apertures in their tops for the reception of other steady pins for regulating the register when the sheet of paper is reversed for completing.

The motions of the various parts of this machine are produced in the order in which they are required through the medium of various levers, wheels, cams, and pulleys, possessing separately little novelty, but well arranged to effect in combination, the different and somewhat complicated motions of the machine. These, however, we have not deemed it necessary to detail at length, as different forms of them may be used without abandoning the principle of the invention.

STAMPING.—To C. M. Harrington, of Nelson Square, Surrey, a patent for "an improved apparatus for impressing, stamping, or printing, for certain purposes," was granted on the 22nd of January, and the specification was lodged in the Enrolment Office on the 22nd of July, 1831.

The object of this invention is to prevent frauds, by registering at all times the number of impressions upon the articles stamped or printed; which is proposed to be effected by means of four or more small wheels, each having ten teeth or points projecting from its circumference, with the characters 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0. These wheels are placed side by side on the same axis, with springs between them to keep them steady, and a projecting pin on the first to turn the second one tooth whenever it has itself completed a revolution, and the second in turn moves the third one tooth for each of its revolutions, and so on till the number reaches 9 9 9 9, if four wheels be employed, or any other number made up of as many nines as there are wheels employed. The first wheel is actuated by the stamping press, so that it shall move one tooth or number with every impression. Now as this numbering apparatus is placed immediately in connection with that part of the stamping machine which gives the impression, and at the same time turns the first wheel one tooth, it is evident, that each impression will be numbered as it is made; rendering the stamping of a duplicate of any of the numbers impossible.

SUGAR.—To J. Bates, of Bishopsgate Street Within, London, a patent for "improvements in refining sugar," was granted on the 31st of January, and the specification was enrolled in the Petty Bag Office on the 31st of July, 1831.

The intention of this invention, which is said to be the communication of a foreigner residing abroad, is to purify the sugar for the use of confectioners, from the charcoal used in discolouring it. There are described in the specification various modes of carrying the patentee's intentions into operation; but the simplest form of the apparatus will be sufficient for us to explain its nature and principle of action. Fig. 3, Pl. XI., represents this purifying apparatus, which consists of a vessel *a* for containing the syrup to be purified; *b* a pipe which conveys it into a pan *c*, from thence it passes by the pipe *d* into the rotatory filter *f*, supported upon the standards *g g*. *h* is a coupling joint packed to allow one part of the pipe *d* to turn within the other without the escape of fluid. *i* is a handle by which the filter is put in rotation,

and *k* is a vessel for receiving the filtered syrup. *l* is a vessel containing hot water, from which a pipe *m* proceeds in two branches *n* and *o*, to the pan *c* and the filter *f*, for the conveyance of hot water for the purpose of diluting the syrup and washing out the apparatus. The rotatory filter *f* is made of two circular end pieces fixed on a hollow axis, and joined together by a series of ribs, which are to be covered with woollen cloth, to constitute the filtering medium, and the whole is secured together by a series of hoops, as shown in the figure.

In order to increase the filtering surface, pockets of cloth are made to extend through between each pair of ribs to very near the centre of the apparatus, and these are kept distended by means of serrated pieces of wood attached to the ribs or end of the machine.

Although the patentee describes this mode of increasing the filtering surface, he does not claim it as an essential part of his invention. Another mode of constructing and working the apparatus is described, in which a steam boiler is introduced instead of the hot water vessel *l*, and this is provided with the necessary pipes and connections for the supply of steam to the pan *c*, which is made double that it may be heated without the steam coming into contact with the syrup if required. Communications are likewise introduced for the supply of hot water from the steam boiler to the syrup pan, and also to the filter for the purpose of diluting the syrup and washing the apparatus whenever these operations may be required.

YARN, PREPARING, BEAMING, PRINTING, AND WEAVING.—To L. Schwabe, of Manchester, Manufacturer, a patent for "certain processes and apparatus for preparing, beaming, printing, and weaving yarns of cotton, linen, silk, woollen, and other fibrous substances," was granted on the 22nd of January, and the specification was deposited in the Enrolment Office on the 22nd of July, 1831.

The preparing and beaming are processes necessarily preceding that of printing, because yarn, as it is usually prepared and beamed for weaving, would be too irregular in the distribution of threads, as well as in their tension, to admit of their being printed with any certainty of obtaining regularity in the design to be impressed; and the apparatus contrived by this patentee has for its object the proper performance of these processes. It is represented by fig. 4, Pl. XI., which consists of a strong frame, similar to that of a common loom, with two yarn beams *a* and *e*;

a being kept steady by the weighted lever *b*. The yarn is first to be warped and beamed upon *a* in the usual way, and then transferred to *c* with great regularity of distribution and equality of tension by the following process:—

It is to be carried across the frame, through a set of healds *k*, and a reed, that a few shoots may be woven in order to fix the ends of the warp. A double ring *i*, denominated a mail, is suspended from each thread by means of a *lingo weight m*, and the suspending lines are passed through a perforated board, suspended by the four corners from the frame of the machine. This perforated board is shown detached by fig. 5. The use of the lingo weights is to preserve an equality of the tension on the threads as they are transferred from the beam *a* to the beam *c*. The places of the beams are then to be changed, and the yarn is to be printed as it passes over the print table shown within the loom frame.

This print table must be covered by a piece of calico equal in length to the yarn, and wound upon two rollers represented at *d*: the motion of these rollers is connected and rendered simultaneous with the motion of *c* by the band *g*. The calico *e e e* is drawn over the table in the direction of the arrows by the motion of the cylinder *d*, so as to bring a clean part over the table for every impression of the printing blocks.

MUSICAL INSTRUMENTS.—To J. C. Schwieso, of Regent's Street, London, a patent for "improvements on piano fortes, and other stringed instruments," was granted on the 2nd of February, and the specification was lodged in the Enrolment Office on the 2nd of August, 1831.

A very few words will be sufficient to explain the nature of this invention, which is one of considerable ingenuity and utility. It consists of a cast iron framing shewn at *a b* for securing the wood constituting the string board of the piano forte, and having a projecting plate *d* for the tuning pins *e e e*, which are to be made of steel, the lower end being turned cylindrical for coiling the ends of the strings as shewn at *f f f*, and their upper ends are made square for the reception of a key by which the tuning is performed. In order to give these tightening pins the requisite friction to make them turn with facility, and retain any required degree of tension on the strings, they are furnished with flanches on the under side of the plate through which they pass, and with screwed nuts above it, and with leather washers, to give a degree of elasticity to the bearing parts. The nut is to be screwed up

to produce the requisite friction, and then by means of small holes in its upper surface, for the reception of two projecting pins from the lower end of the tuning key, as shown by fig. 5; the nut and tightening pin are turned together, and therefore no change of the friction will be produced by turning the tuning pins.

Applications of the same sort of tightening pins to the harp and violin are given in the specification: and the improvement in both cases consists simply in passing the pins, which must be of metal, through the frame of the instruments, that their friction may be regulated by nuts, as in the case of the piano forte.

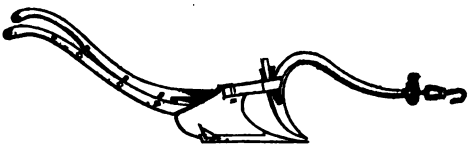
FINLAYSON'S SELF-CLEANING PLOUGHS AND HARROWS.

In all the modifications of the ploughs which I have hitherto described, the angular corner, where the coulter and beam are united, forms a receptacle where weeds, stubble, and other tenacious substances accumulate, till the plough becomes partially or entirely lifted out of the earth, and consequently ceases to perform its work. This is particularly the case when breaking in new ground, which has become tenacious by the roots of bent and other deep growing vegetables. To remedy this inconvenience, Mr. Finlayson designed and had constructed a plough with the fore parts of its beam and upper parts of its coulter uniting in the same circular curves, which from its appearance he denominated the crane neck or rid plough.

The radius of this curve is about equal to the length of the coulter. Now it is evident, that the weeds and tough pieces of earth will be carried as they rise round the curved part of the beam till they tumble off by their own gravity, and hence a plough thus constructed, will remain sufficiently clear, under every circumstance, to perform its work.

Indeed, it is one of those inventions arising out of an absolute necessity, and therefore it could scarcely fail to answer the purpose for which it was designed.

The inventor having ploughed about twenty acres of strong waste land, in due time proceeded to give it a second ploughing, in a different direction from the first, when the furrows proved so tough, and the quantity of undecomposed vegetable matter so great, that with one of the best ploughs of the usual construction, and two men with spades to keep it clean, he found it quite impossible to effect his purpose, and he was compelled to suspend the ploughing till he got constructed a plough with a crane necked beam and curved coulter, as here represented, by which he was

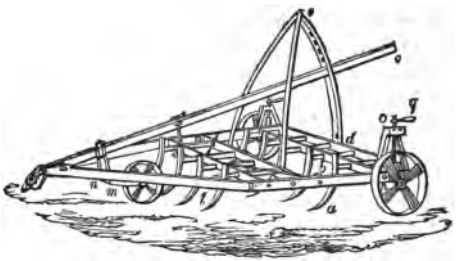


enabled to plough this new and stubborn land with as much facility as a piece of ordinary fallow.

The point of the coulter takes the earth with a more acute angle than coulters usually do, and hence in its cutting action is more perfect, and the weeds which remain uncut have a greater tendency to rise upon it to the surface, a circumstance of considerable importance, which induced Mr. Finlayson to apply the same principle to an improved harrow, of the grubber kind, which like the plough, is self-cleaning, from the circumference of the tines being made of a curved form, and also from their being placed before, instead of passing through the rail of the harrow from below upwards.

It is made entirely of iron, and supported on three small wheels, with adjusting screws, by which it can be regulated to cultivate the required depth. A lever, which has for its fulcrum the frame in which the fore wheel turns, had its short arm attached to the front of the harrow, and its long arm extending backwards to be within reach of the attendant, that he may raise the harrow out of the ground, as occasion may require.

The following cut affords a perspective view of this harrow.



a l representing the curved tires; *c* the lever by which the depth of the harrowing is regulated; *e d* a frame for holding the lever *c* in any required position; *m n* the frame in which the fore wheel moves; *o* a screw, and *q* its handle, for regulating the altitude of the harrow on the hind wheels.

These inventions being both the offspring of necessity, like all other legitimate offspring of this prolific mother, have proved eminently successful; and their superiority has been sufficiently attested by their general introduction in Scotland, and in many places in this country.—*Mr. Christie's Lecture on Improved Agricultural Implements, at the London Mechanics' Institution.*

ROCKET STAFF.

[From the Transactions of the Society of Arts.]

The Large Silver Medal was presented to W. H. Hood, *Esq. Commander R. N., for his Rocket Staff for naval or military purposes; one of which has been placed in the Society's Repository.*

Feb. 24, 1831.

Sir,—May I request that you will be pleased to lay before the Society an instrument which has been planned by me for discharging signal rockets, or those that may be intended for alarm.

A little more than two years since, I submitted the plan (under the authority of his Royal Highness the Lord High Admiral) to the ordnance department; and the first instrument which I had constructed, of a piece of good oak hollowed out and partially lined with copper tube, lies in the repository of Woolwich arsenal; his majesty's ships being now supplied from those that are made nearly after the said pattern, but of thin sheet iron formed to the shape and brazed. Prior to the invention, there was nothing of the kind in use, but rockets were generally discharged from the barrel of a musket, from the hand, or by placing them vertically against a staff or some erect object; one hand of the person being engaged to steady it, while the other was used for setting it off with a port-fire, or some combustible substance lighted for the purpose. The instrument, which I herewith present to the Society, with some small rockets, is also accompanied with a sketch and a written description of its proportions, and the various applications of it to sea and land service. And as it is usual for steam-vessels, packets, and other vessels in the habit of making our coast, to announce their arrival at night, and to use them otherwise at sea, I trust the public will be benefitted by the invention being made known through our annual publication.

I am, Sir, &c. &c.

A. Aikin, Esq.
Secretary, &c. &c.

W. H. Hood,
Commander, R. N.

Reference to the Figures.

This staff, fig. 1, Pl. XII. is drawn one-eighth of the real size; it is made of iron tube, the lower portion *a a* one inch and a half diameter, and four feet three inches long. The upper portion *b b* is two inches diameter, and two feet nine inches long, making seven feet total length. The upper end of *b b* is cut like a quill tooth-pick to form a bayonet, the sides and point being kept well sharpened: the remaining cylindrical part receives the body of the rocket; it is shewn in place by dotted lines, the stick projecting down the tube *a a*. Close under the shoulder *c*, where the rocket rests, is placed a gun-lock, from the chamber of which a small tube, shewn by dotted lines, ascends to the middle of the under part of the rocket. As this staff cannot be pierced, all the parts of the lock are placed on one side; *d* the trigger; *e* its spring; *f* the main spring; it passes under the middle of the trigger to the tail of the cock. Fig. 2 is an end view, looking down the tube; it shews the little tube which communicates between the lock and the rocket.

The whole, when charged with a pound rocket, will not weigh more than 6 or 6½ lbs., being within the weight of a soldier's musket. As applicable to warfare, for the use of sentinels or videttes, the instrument might be carried as a pike or as a warder's staff: in either case it should be brought to the charge, and from thence to a vertical position, on alarm being necessary, the holder applying his right hand to the lock, while with the left he keeps the instrument steady till the rocket has ascended; the sentinel again reverting to the charge has his farther defence.

In the use of the instrument for experiment, on several occasions within the last two years, in rainy weather, I invariably placed over the head of the staff, a coating of light oiled paper, which was continued as low as the lock, to cover it: and on many occasions, after the whole had been exposed to six or seven hours' rain, the rocket went off on the slightest touch of the trigger, tearing its way through the oiled paper covering. It will be seen, that from the priming pan of the lock, there is a slight hollow tube on which the rocket rests, and through which by a fuse the flash is conveyed to it.

For steam vessels, packets, and the merchant service, where the instrument will be required solely for making night signals, the bayonet may not be necessary; consequently the instrument will be still lighter, and the oiled paper cap is much easier put on.

OBSERVATIONS ON A NEW MODE OF CONSTRUCTING HARBOURS.

By WILLIAM MATHESON, Civil Engineer.

[Communicated by the Author to the Edinburgh Journal of Science.]

THE importance of good harbours to a mercantile country will be universally admitted, and the commercial eminence great Britain has attained, has naturally directed the attention of persons interested in the extension of her trade, to the improvement of the surrounding harbours; and perhaps in no way has the skill and ingenuity of engineers been more extensively employed, or more usefully directed. Many great works have been executed at an enormous expense, and some of them have succeeded more or less, to the expectation of the parties.

The erection of works within tide mark must always be attended with trouble and additional expense, and it is more to be lamented after such expensive operations have been carried into effect, that the whole benefit of them should be frustrated by some unforeseen circumstance, which has too frequently happened in such operations.

Of these latent difficulties, none has had more powerful influence than the tendency of the tide, or the motion of the waters in particular situations, to silt or sand up spaces which have been enclosed, and upon which, by means of such inclosures, a change has been made upon the currents.

This tendency to sand up is peculiar to every situation, where quantities of sand are under the influence of the tide or the motion of the waters, and liable to be carried from place to place in mechanical combination with the water, either by means of the ebbing and flowing of the tide, or of the motion given to it by particular currents; or, by what is most powerful of all, the motion given to it by the violence of the winds.

This motion of sand is generally in a direction opposite to that in which the wind is blowing, as may be seen in standing pools or lakes, where the sand, when the water is agitated by the wind, takes shelter under the banks of the weather side; but this will be more particularly explained afterwards.

In consequence of this tendency, the mouths of all rivers, and flat shores, and all bays and estuaries into which the tide rushes with violence, are more ot less subject to the accumulation and shifting of sand banks, if sand is to be found in such situations. Examples of this may be seen by examining the harbours of Aberdeen, Dundee, Dublin, and a variety of others; and it may be generally asserted, that no harbour was ever erected upon a river that was not more or less subject to the inconvenience of shifting sand banks at the mouth of the river, or of being itself sanded up.

The writer of these observations having been employed at an early period of life in works connected with harbours, his attention was particularly directed more than thirty years ago, to the annoyance met with by the sanding up of harbours; and he saw the object frustrated, after the most expensive works had been erected, in the hope that they would answer every purpose expected from them.

Never losing sight of the evil which he had observed, nor ever ceasing to feel a desire to have it removed, he at last, by mere accident, discovered in the harbour of Pulteney Town, a circumstance which led him to a corrective theory upon the subject.

An opening had been left in the inner pier for upwards of a year, while the other operations of building were going on, and through which opening the receding tide, assisted by the land stream, passed into the harbour, and swept round and again passed out at its mouth. By this action of the tide, the harbour was kept perfectly free from any tendency to sand up; but in the course of a very short period, after the works were finished, and this opening closed up, in completing the harbour, the sand accumulated in it to such a degree as to make it inaccessible to vessels of even very small tonnage, and to cause the outlay of a large sum of money in the erection of an outer harbour which it is probable will be visited by the like obstructions, if they have not already taken place.

The practical hint thus afforded, induced the writer to form the idea of erecting the necessary works for sea harbours, with

artificial openings, so constructed as to enable the waters still to retain their natural motion, and by that means to avoid eddies and stagnation, by the latter of which the sand and alluvion are deposited, and by the former of which the deposition is shifted and whirled from place to place.

His plan, therefore, may be very shortly described. Wherever it may be necessary to erect a harbour, or to extend the works of one in a situation where sand or alluvion may be likely to accumulate, he proposes, after laying a solid foundation of stone, to make the next range of building consist of a succession of arches of such a height of opening as not to disturb any class of vessels that may frequent the harbour, while they are protected and sheltered by the solid building erected over these arches, and at the same time the openings shall be so proportioned to the depth of water, at the different points of the building, as to allow the tide to pass freely through.

To enter into any detail as to the particular mode of constructing the works or of forming the arches, &c. is quite unnecessary here, as these must vary according to circumstances. It is enough, if it is admitted that walls with arches may be constructed under water, as well as solid walls; because so much being granted, it will appear sufficiently obvious that the motion of the tide, either in approaching or receding, will naturally pass through these arches, and carry with it both in advancing and retiring, whatever is mechanically united with it, and the agitation kept up upon the bottom of the harbour will prevent the sand being deposited.

There is another mode already hinted at of sand being collected, which the peculiar construction of harbours here described is equally well calculated to counteract. It is a fact well known to some of those who attentively observe the operations of nature, that all floating substances, especially such as do not rise above the surface of the water, approach the shore with a land wind, and recede from it by a contrary wind. This seems to arise from the violence of the wind upon the water causing the surface water to pass from the shore, and the under water to approach it, to supply its place by means of an opposite current. This under current is the more conspicuous in its operation, when the tide flows or ebbs in a contrary direction to that of the wind, and the floating substances carried along are accordingly deposited.

The consequence is, that wherever large solid buildings are erected in a current of water, which has a tendency to sand up, and where these buildings pass along the shore, the wind from the shore that passes over them causes a sand bank to be formed seaward of the building, and to bring it directly into the mouth of the harbour, if it happens to be in the line of that building. This fact is strongly exemplified by the sand already accumulated

at the back of the wet docks at Leith, or the stone pier at Newhaven, and in many other situations.

9, *Dean Street, Edinburgh,*
30th Nov. 1831.

FILTERING THE THAMES.

TO THE EDITOR.

July 27, 1831.

Sir,—In the 94th number of the Journal of Patent Inventions you have given a description of Mr. Wright's plan for supplying London and other great towns with filtered water, in which it is stated that over the joists are to be placed large flints, and smaller in succession. I think, sir, that if instead of the flints, there were used a layer of bricks, made with equal parts of clay and small coal finely powdered, that the coal would in the kiln burn away and leave a very porous brick, through which water would run readily; thus diminishing the depth of the filtering bed materially; as the large flints would not stop any thing that might be in the water after it had passed through the gravel and sand at the top; but would merely prevent the sand from falling into the filtering chamber, while the shingle might be placed immediately on the bricks.

I am, Sir,
Yours,
E. F. W.

AMERICAN PATENTS.

For a new Method of blasting Rocks. Moses Shaw, *formerly of Novia Scotia, but now of the city of New York, June* 3.

The mode of blasting rocks for which this patent has issued, was described in Professor Silliman's Journal, about a year since, (vol. 16, p. 372,) to which we refer our readers, as the account there given, though brief, is much more clear than the description supplied by the patentee, and the wood cut accompanying the former illustrates the design more perfectly than the very indifferent drawing which makes a part of the latter. The object proposed is to blow off very large masses of rock, by making a number of simultaneous explosions; to effect which a number of holes are to be bored, which may stand round in a circle, and be so inclined as to point to one common focus. A priming compounded of fulminating silver and gunpowder, is to be ignited by a shock from the electrical machine, there being a suitable arrangement of wires made for that purpose.

For a "Revolving Cotton Whipper." ELISHA BAKER, *Warwick, Kent County, Rhode Island, June 4.*

"THE essential principle or plan of the Revolving Cotton Whipper, and which distinguishes it from the common cotton whipper, consists in the rotary motion, and the machinery connected with this motion, and especially constituting the improvement, are two vertical cylinders placed near each other; each cylinder being covered with projecting points, and these points being so placed on the cylinders, that when the cylinders revolve the points on the respective cylinders will meet and pass each other."

"The operation of the revolving cotton whipper is as follows, viz. power being applied by means of a belt to the pulley on the driving shaft, the two cylinders are put in motion. The cotton is introduced among the whipping sticks, through the hole in the top of the curb; and the extremely rapid motion of the whipping sticks very soon whips, picks, and prepares the cotton perfectly, and discharges it through the opening at the bottom of the curb."

The foregoing quotations comprise the first and the last paragraphs of the specification, and afford as good a view of the structure and object of the machine as can be given without the drawing.

For a Machine for grinding or preparing Clay for Bricks, and for moulding and pressing the same. NATHANIEL ADAMS, *Cornwall Orange County, New York, June 22.*

THE clay to be prepared is put into a circular trough made in the usual manner. A horizontal shaft, attached to a vertical one, is drawn round by a horse. The horizontal shaft is cylindrical, and has upon it a hub or nave, which revolves round it; from this hub twelve or more spokes project, these are furnished with knives on their ends, and, as they pass round in the trough, the knives cut and prepare the clay.

The press is a rack and pinion press; the bed upon which the moulds rest is brought under the follower, by a rack and pinion working horizontally.

"The follower is made of two iron plates about 6 inches wide each, and about 21 inches long, which are fastened to a bar of iron crossing lengthwise the box, making a joint in the form of a door hinge, or butt, which after pressing all the clay out of the box, will shut up by raising the press, and open again by the spring hooks aforesaid."

"What I claim as my invention is the mode of pressing, and the follower, as before described; likewise the revolving grinding machine, with the knives attached to them."

For an Improvement in the Mode of raising, straightening, and laying the Nap upon Woollen Cloths, and Cloths upon which a Nap is commonly raised by teasing. THOMAS HURD, *of the City of New York, and* JESSE FOX, *Lowell, Middlesex County, Massachusetts, June* 23.

THE machinery for which this patent is taken, is described at great length, and represented in a number of different drawings. The main object of the patentees will be seen by the annexed quotation, which comprises the concluding part of the specification.

"And as metallic wires are set and fixed, in the manner of the common cards, in leather, or felt, at a considerable distance from each other, upon a plane, or upon a cylindrical surface, have heretofore been used for the purpose of teasing and raising a nap upon cloth, it is to be distinctly understood that wires so set, and such cards, and the setting or fixing of wires, or pins, in such manner as last aforesaid, or in any manner in which they have heretofore been set and used for the purpose aforesaid, is not claimed as a new invention; the chief advantage arising from our invention consisting in the setting and fixing of pointed metallic wires, pins, or points, or wires or pins so small that the ends may serve for points, with little or no sharpening, in a firm manner in frames, or in or upon metallic plates, or in or upon a metallic substance, or any substance in or upon which they may be set, and fixed with sufficient firmness, comparatively closely, or very nearly together, and much nearer to each other than they have heretofore been placed, set or fixed, in any such cards, leather, felt, or otherwise, so that the points may the better serve as gauges to each other, act upon many points of the cloth at once, require but a light touch, or pressure of the cloth upon them in order to accomplish the work, and without taking such rank hold upon the cloth as to injure it, raise a nap uniformly thereon, with much more facility and expedition, and in a far better manner than can be done by the cards or teazles aforesaid, or any mode or means hitherto in use. And notwithstanding that we have mentioned and recommended the application of heat, steam, and water, in the operation, and described a mode of operating, and machinery which is deemed advantageous in the use of our inventions, but which may be used or not, or varied at the discretion of the mechanic or operator, and which a mechanic of ordinary skill will readily understand, we hereby nevertheless explicitly declare that what is claimed by us as a new invention and improvement, and all of which we the said Hurd and Fox claim herein, as our original invention and improvement, is the setting, placing pointed metallic wires, pins, or points, and wires so small that the ends may serve for points with little or no sharpening," &c. &c.

Specification of a Patent for an Improvement in the Stock and Hand Vice. Granted to ENOCH D. M'CORD, *of the Village of Sandy Hill, in the county of Washington, New York, October* 1, 1830.

IN the vices which have been heretofore in common use, the washer

between the head of the screw and the front stock, and that portion of the pipe box which comes in contact with the back stock, have merely plane surfaces, at right angles with the axis of the screw, which press upon corresponding surfaces upon the two stocks. When the vice is closed, they are in perfect contact; when it is open they are not. When a common blacksmith's vice is opened four or five inches, no part of the washer touches the stock, but its upper edge; when, therefore, an attempt is made to secure any large body in it, it cannot be held as firmly as a small one, and the screw is in danger of being broken. To obviate this difficulty is one of the principal objects of the present improvement.

To effect this, the washer to be used under the head of the screw, and the front end of the pipe box, I make in the form of a segment of a globe, perforated in the centre for the reception of the screw; a cavity to correspond is made in the outside of each stock, at the place through which the screw passes, and fitted so as accurately to receive one of these spherical segments, and thus form a segment of the ordinary ball and socket joint, which will adapt itself to any position of the jaws of the vice. They may then be pressed together with equal firmness, whether a large or a small body is between them, and the screw is not more liable to be broken in one case than in the other. As the stocks of vices in general have no lateral movement, it is apparent that a joint to answer all the purposes desired may be constructed in the form of any regular solid of revolution, or any segment thereof, made parallel to its axis, or coinciding with it; but a spherical segment not exceeding half a sphere, I prefer to any other shape, as the cavities can all be fitted with drills, and less of the substance of the stock will be removed in fitting. It is equally obvious that in constructing this joint, it is not material to have its concave portion upon the stock of the vice, as the principle and operation will be the same if the order be inverted, that is, the washer and pipe made concave, and the stocks convex.

As it is my intention to make most of these vices of cast iron, I have made another improvement, which is, however, equally applicable to cast iron or wrought. It consists in making the face of the jaws of other and harder materials. A plate of steel with suitable teeth cut in it, is screwed to the inside of each jaw, the bottom resting on a shoulder in the stock; or the same plate may be made to constitute the inner portion of a band, driven around the upper end of each stock. When it is wished to avoid the expense of steel jaws in the manufacturing of cast iron vices, the jaws may be chill hardened when they are cast.

What I claim, is the giving such a form to the washers, or to the bearings of the screw and pipe against the stocks of the vice, as shall enable them to adapt themselves thereto, whether the vice be opened or closed; the same being effected on the principles herein described. I also claim the application of steel to form the jaws of cast iron vices, whether the steel be secured to the iron by screws, rivets, bands, or otherwise. ENOCH D. M'CORD.

Specification of a patent for an improvement in the mode of Finishing Paper. Granted to THOMAS GILPIN, *Philadelphia, Pennsylvania, June 25th,* 1831.

I CONSTRUCT a roller, to be made of paper compressed upon an iron shaft, and then turned on the surface perfectly smooth and true, in the same manner as those are made which are used for the callendering of cloth and cotton goods in the usual manner, as well known, and I suspend the same in a frame usually made of iron, with adjusting screws over the journals, to press down the same and regulate the pressure as required; and I also provide an iron cylinder perfectly smooth on the outside, but so large as to afford room to be hollow in the inside for the admission of heat conveniently; say from four to eight inches diameter, and this said hollow iron cylinder is to be suspended in the same frame as the aforesaid paper roller, and may be put immediately below the same, so that by the pressure of the screws, the paper roller may be let down upon the same, and then, when a power is applied upon a pulley in the well known usual manner, either from a revolving strap or cog wheel, to the said hollow cylinder or paper roller, as convenience may dictate, the two rollers are to be brought into contact, and will revolve together. Heat may then be introduced into the iron roller by iron or other heaters, or by steam. The paper may then be passed between the two rollers and be pressed, and to obtain this pressure by the said process, consists my said art or invention. The degree of pressure as well as the skill of managing the same, is to be left to the further experience of the workman.

I have also constructed another machine to effect the same purpose of rolling paper, by using two paper rollers in a similar frame to the above, to move together in contact with each other, so as to admit the paper to pass between them, and in this process I either use the two paper rollers together, or I use them with an iron roller between them, as may be most eligible, but the process I consider as analogous to the preceding.

I have found it necessary also to add a useful instrument to the above invention for the purpose of securing the paper, as it is passed between the said rollers, from injury by creasing, or running unevenly, which instrument I call a conductor.

It may be made in a variety of forms, and such an instrument cannot well be done without in this application and process. The form I have used it in, is by having a flat board suspended horizontally upon axles, with two wheels on each side, upon which the paper may be laid. I have then an open frame made to surround the said board, and suspend the same on the two sides or pivots, the end or side of the open frame next to the rollers rests upon the said board, and the other end or side comes underneath the said board, so that it may be pressed up to it by the hand, the end next the rollers will then come down upon the board, and the sheet of paper when laid upon the board is to be shoved, or pushed forward upon it, but under the end of the open frame which is above the board, and by which

it may be pressed and gripped, as by a pair of tongs, and kept smooth as it is drawn forward from the conductor into the rollers; this end of the open frame had better be wrapped round with a woollen cloth. The effect of squeezing or pressing the paper evenly throughout the whole sheet, so that it may be delivered in an even manner into the rollers by any process, is part of my discovery, as it has never been done in any manner; and I describe the above as one way I have adopted to effect it. It may be done also by pressing a straight edge or cushion up to one of the rollers, and passing the sheet of paper between the straight edge or cushion, so as to gripe the paper against the roller in order to pass it evenly into the action at the contact of the rollers. Another part of my invention consists in fixing a permanent iron bar or rod, opposite to the contact or conjunction of the two rollers, so that accidents may be prevented by things going into them, or persons being caught and hurt by them; the said bar to be connected to the standard or sides of the iron frame in which the rollers are suspended. THOMAS GILPIN.

ON AN IMPROVED MODE OF MAKING PLASTER OF PARIS.

THIS plastic material is obtained by calcining and reducing to powder the native sulphate of lime, or gypsum. The sulphate of lime is known under the name of plaster stone, and is found in general, on the upper parts of the secondary formations, but sometimes on the tertiary ones. In the first, it forms thick couches interposed with calcareous beds; in the second, it forms deposits, more or less extended, and accompanied by clay or marle: it is thus found in the neighbourhood of Paris, where it forms a considerable object of commerce; the department of the Seine alone consumes about five millions of hectolitres. It is also sent to many of the neighbouring departments, and is even exported to England.

The mode of procuring the native sulphate of lime, is either by forming pits or galleries, as in other quarries. We remark, in quarrying the plaster stone, three principal varieties, the one in crystals, agglomerated into irregular masses; of this great quantities are got, containing about twelve per cent. of carbonate of lime; this is the stone which is commonly employed in making plaster to be used in buildings, and for improving the quality of soils. The second kind, formed of lamellar sulphate of lime, crystallized and nearly pure, is found in tables, bisected at their bases by oblique angled parallelograms; it is also met with in the forms of prisms and lentils, more or less large, isolated in groups or rosettes, and also in the form of the heads of lances; it is yellow, and as clear as water. It is used for the making of the finest plaster, which is employed for making moulds and casts, and in stucco. The third variety, used in the arts, is found in homogeneous masses, semi-transparent, white, but containing yellow zones: it is capable of acquiring a greater degree

of hardness, by a slight baking, and of receiving different tints. This substance, which is known by the name of alabaster, is made into vases, and various other ornamental objects, but it must not be confounded with the alabaster of the ancients, which was a crystallized carbonate of lime, of a yellow colour, veined, and capable of receiving a high polish.

We also find in nature a kind of anhydrous sulphate of lime, but as it is not capable of becoming solidified with water, so it is not employed. A bluish silicious variety, which is found in Italy, is employed in making chimney pieces, pavements, &c.

It is the crude sulphate of lime, which, disseminated in great abundance in the soil of Paris, and the surrounding heights, communicates to the water in the wells of this city, that selenitic quality, which renders it improper for the purposes of washing and boiling vegetables. We may, indeed, in part, remedy this inconvenience by decomposing the sulphate of lime, with which it is nearly saturated, by the sub-carbonate of soda, which precipitates the lime in the state of a carbonate: it will require nearly 250 grammes of the sub-carbonate of soda for 100 litres of water, admitting that this contains the three hundredth part of its weight of sulphate of lime.

On baking the plaster.—They use for baking the plaster, many sorts of furnaces; but that which is most commonly employed consists of a rectangular building of from eight to ten feet square, and about nine feet in height, formed of three walls, built either of bricks or rough stones, of from sixteen to eighteen inches in thickness, terminated by a vaulted arch, and covered by a roof, at the distance of two feet.

They construct, across the mouth, or open front of this building, with plaster stone, several parallel rows of vaults, employing for this use the best shaped stones; they then cover these vaults with more plaster stone, first using the larger pieces, then smaller ones, and, finally, covering the whole, near to the vault, with the smallest pieces, and the dust formed in breaking the plaster stone. They then place, underneath the vaults formed in the plaster stone, either some bavins of dry wood, or billets, or faggots, according to the locality. The flames penetrate through the vaults, and the stones which surmount them; but they finally escape through flues made in the wall opposite to the front of the furnace, near the chimney.

Lime kilns, where the calcination may be continued without intermission, without employing wood, but pit coal, may also be used, in various localities, for baking plaster.

Whatever may be the mode of constructing the furnace adapted for this operation, we may remark great variations in the quality of the plaster obtained; in fact, those parts of the stone which are nearest to the fire, in consequence of the temperature being too great, begin to undergo an igneous fusion, which renders the plaster incapable of imbibing water, like the native anhydrous sulphate of lime. Also, in the middle of the same stones, and especially in the centre of those which are the farthest removed from the fire, we always meet with a nucleus, more or less great, of crude, and, consequently,

inert plaster. We may readily conceive that a mixture of the parts which are too much calcined, with others that are too little baked, in different proportions, must yield a product of a greatly variable quality. It, indeed, sometimes happens that the whole quantity in a furnace is either too much or too little baked, and thus furnishes a plaster unfit for use, and which the builders refuse to employ, and with reason. In this case, the purchaser is generally obliged to mix the bad plaster, in various proportions, with that of a better quality.

We may readily conceive that from these causes we most generally obtain plaster of an inferior quality. I have occupied myself in searching for the means of constantly producing plaster of the greatest degree of hardness, and have to remark,

First. It has hitherto been thought that it was the lime, in certain varieties of the plaster, which augmented its hardening quality, when mixed with water. But, in fact, the temperature most fit for calcining it, appears from my experiments, to be much lower than that usually employed in the decomposition of carbonate of lime; and if this latter substance concurs in ameliorating the quality of the plaster, in some of the processes in use, it is probable, that from its interposition, it facilitates the transmission of the heat, and hinders in part the ill effects of calcination at too high a temperature; and it appears that the granular carbonate is harder than plaster, as used in various mortars.

Secondly. In various parts of the ordinary furnaces, the calcination, being unequal, produces great differences in the useful properties of the plaster obtained, and nearly all the kinds produced are defective, either from the excess or defect of the temperature.

Thirdly. In fact, the interior parts of the calcined stones contain crystals, either not altered, or incompletely deprived of their water of crystallization, and are thus deprived of the properties we seek for in this plastic material.

These preliminary remarks lead me to suppose that the degree of temperature fit for the baking of plaster, is considerably less elevated than that generally employed, and indeed I was not long in ascertaining the fact, by the following experiment.

I reduced into coarse powder some of the plaster stone, from Montmartre, and exposed it on the outside of a tube, to the heat of a continued current of high pressure steam, at 105 degrees, as it passed through the tube. At the end of six hours, I ground this powder fine, and knew, upon mixing it with water, that it had acquired the property of solidifying with greater energy than plaster of the same sort, baked in a furnace in the usual manner. Wishing to know the limit of temperature at which the native sulphate of lime in powder lost its water of crystallization, I tried successively the effects of still lower temperatures, and found that at 80 degrees of the centigrade thermometer, the plaster obtained solidified with water, whilst the fragments of impure plaster, in small lumps, were not sufficiently calcined at 95 degrees; and, in fine, that the regular crystals of sulphate of lime, exposed to the same temperature, were only partially desiccated; the effect not penetrating to any great depth.

These facts permit me to hope, that we may now be able to treat plaster stone, in the large way, with regularity, and thus constantly obtain this plastic material of the best quality. In fact, as the whole question of baking the plaster is now reduced to a simple desiccation, easily effected by steam, so all the difficulties hitherto experienced, from the bad construction of the furnaces, whether heated by wood, pit coal, or turf, may be made to disappear.

We can also thus usefully employ the enormous quantities of plaster stone in powder, which now encumbers the quarries: as it would be proper, henceforth, either to crush the stone into small fragments, or still better, to grind it to a coarse powder in mills, before baking it. This first labour would not be lost, as the baked plaster might be sifted, and directly employed without being subjected to pounding or beating, an expensive operation, and which always causes the loss of a great quantity of the material.

A perfect regularity in heating the plaster stone may be attained by means of steam; using an inclined plane, formed of cast iron tubes, flattened at top, and communicating with each other at their ends. This steam tube is to be connected with an ordinary high pressure steam boiler, and so disposed that the condensed water may return again into the boiler. A manometer (or steam gauge) must be placed on one of the tubes, to indicate the pressure of the steam, and to regulate the temperature accordingly. A pipe with a stop cock must be placed on one of the most elevated parts of the tubes, in order to permit that air to escape which might oppose the constant communication of the steam. We could also employ a set of cast iron plates, which might be covered with plaster stone to be baked upon the steam tubes, and be removed when that operation has been performed, and replaced by others in constant succession.

Whatever has been the mode of baking adopted, we must carefully prevent the plaster from being exposed for a long time to the air, and especially when it is moist, as it would absorb the water again by degrees, and thus become incapable of hardening when we would employ it, and, in fact, will have become an inert powder.

To use this plaster, we have only to add to the powder a sufficient quantity of water, when it will directly assume the consistence of ordinary mortar, and must be mixed up with a trowel.

The fine plaster, mixed with a solution of glue, and having afterwards various hard and coloured substances incorporated with it, forms the basis of one of the processes employed in the making of stucco, to imitate marble. Plaster is also employed in buildings, and in moulding objects of sculpture: it serves to decompose the ammonia, in the manufacture of sal ammoniac, and great use is made of gypsum in agriculture.—*Dictionnaire Technologique.*

ON MAKING ARTIFICIAL PEARLS.

[From the Dictionnaire Technologique.]

These are small globules, or pear-shaped bulbs, blown in thin glass, and each pierced with two opposite holes, by which it may be strung. These are afterwards prepared in such a manner as to greatly imitate the rounded and brilliant concretions, reflecting the irridiscent colours, which are found in certain bivalve shells, such as the pearl muscle, &c., and which bears the name of oriental pearls.

We can perfectly imitate the brilliancy and reflection of these natural pearls, by means of a liquid termed essence of pearl, and which is prepared by throwing into liquid ammonia the brilliant particles which are separated by friction and washing from the scales of a small river fish, named the bleak.

These pearly particles, thus suspended in the ammonia, can be applied to the whole interior of these glass bulbs, by blowing it into them; after which, the ammonia is volatilized by gently heating them.

It is said that some manufacturers do not employ the ammonia; but instead therof, suspend the pearly particles in a solution of isinglass, well clarified, and which they drop into the bulbs, and then turn them in all directions, in order to spread it equally over their interior surfaces. There can be no doubt, that in this mode of applying the pearly mixture, the same success will be obtained as in the before mentioned process, and that it will afford a layer of the same thinness and brilliancy.

It is important to succeed in the perfect imitation of pearls, that the glass bulbs or pears employed should be of a slight bluish tint, opalized, and be also very thin, and likewise that the glass should contain but little potash, or oxide of lead. In each manufactory of these artificial pearls, there are workmen exclusively employed in the blowing of these glass bulbs, and which indeed requires a great skill and dexterity to succeed well therein; a dexterity, indeed, which can only be acquired by long practice.

The French manufacturers of these artificial pearls have at length attained a degree of perfection before unknown. We must add, that the bulbs are finally filled up with white wax. L*****k.

ACCOUNT OF A LARGE MAGNET.

[From the Journal of the Franklin Institute.]

The following is a short notice of the large magnet which is now the property of the Philadelphia museum, and is deposited in their collection of philosophical instruments.

It was made in the summer of 1825, by myself, and its power tried in the presence of R. M. Patterson, M. D. now professor of

natural philosophy, and chairman of the university of Virginia. It consists of fifteen bars, of what is called the "horse shoe" form, put together and secured by screws, in the usual manner. The bars measure round the outside 43 inches, and are made of the best shear steel. The "keeper," which is of soft iron, and the ends of the bars are accurately ground, so as to ensure a perfect contact in every part.

The whole instrument, keeper and rings complete, weighs 53 pounds. The bars were "touched" by a nice bar magnet, the property of Mr. Isaiah Lukens, according to his newly discovered method, in the comparatively short space of 30 minutes, and can at any period be restored to their maximum in the same time. A passing tribute of respectful notice is due to this gentleman, for his manner of making and "touching" magnets. He has most ingeniously reduced to a system, the art of giving to them their attractive power, performing in a few seconds, and with infinitely increased strength, that which in the hands of the makers of mathematical and philosophical instruments, was, and still continues, a mysterious and secret business, involving much time and labour. This magnet on its first trial, required a force equal to 310 pounds to separate the "keeper" from the bars; this may justly be considered as the maximum power of the instrument. After the removal of the "keeper," its force remained permamanently 134 pounds, which is justly considered its permanent maximum.

We have in this instance a much greater increase of power in comparison to weight, than has hitherto been considered possible in the formation of magnets of a large size: there is nothing on record (as far as our knowledge goes) that will compare with it, and our notice is given for the purpose (in a measure) of eliciting facts of a similar character.

NATIONAL REPOSITORY,

CHARING CROSS.

An improved Portable Stand and Plane for a Theodolite, or a Spirit Level.—By C. RONALDS, *Esq. Croydon.*

BY his intimate conversancy with geometrical and mechanical principles, Mr. Ronalds has produced, with almost the least quantity of material, a solid structure. Every thrust, strain, or twist, to which the apparatus in its applications is exposed, is met by the best possible disposition of the parts which compose the framing. It is scarcely possible to conceive how more appropriate strength can be derived from an equal quantity of matter. —*Catalogue.*

Specimen showing the effect of the Caustic Transfer Varnish. *By* R. ACKERMAN, *Strand.*

BY means of this varnish, the impression of an engraving may be very perfectly transferred from the paper and made to embellish the surface of wood, or other material, not calculated to receive a first impression from the plate. A new source of tasteful occupation is thus opened to those whose leisure allows them to cultivate the decorative arts for their amusement; and at the same time an extension of means is given to those whose business it is to finish many articles of ornamental workmanship.—*Ibid.*

Miniature Model of the Terraqeuous Globe executed in Germany.

Sent in by C. BARING WALL, Esq.

ALLOWING for the exaggeration necessary to make the prominences on the earth's surface apparent on so small a sphere, this globe affords a display exceedingly interesting to the student of geography, and perhaps more especially to the geologist. Such models speak so much more intelligibly to the eye, than do attempts by the graver, to delineate the mountain ranges of our planet. It is to be hoped that the improvement in art demonstrated in the present specimen of foreign assiduity and talent, will be adopted in our own country; and that the ingenuity of our British artists will furnish us with fac-similes of that which the patient labour and diligent inquiry of the German artist have so admirably achieved. The information of volumes is here imparted in a glance of the eye.—*Ibid.*

MISCELLANEOUS.

VOLATILE OIL.—At a time when locomotive engines are likely soon to be found traversing all the populous districts of ths country, it becomes highly desirable that these moving furnaces should be so heated as not to annoy the inhabitants with a never ending stream of smoke, and we have the pleasure to find that this desideratum can now be effectually attained. In the manufacture of resin and oil gas a large quantity of volatile oil is collected. This combustible liquid is now used instead of coal at the oil gas works at Leeds to heat a bench of four retorts, which generate 600 feet of gas per hour; and the heat is kept up during the day without the slightest variation, with two gallons of the volatile oil per hour, giving out neither the least smoke nor smell. The advantages of this discovery for the use of locomotive engines it is scarcely possible to appreciate; and it is not amongst the least of them, that two gallons of the volatile oil, weighing only 16lbs. will produce as much heat as 112lbs. of coal or coke, thereby diminishing the weight of fuel to be carried seven pounds in every eight.—*Leeds Mercury.*

TANNING OF LEATHER BY GRAPE MARC.—A medical man of the neighbourhood of Narbonne, has announced that the marc of grapes after being distilled for the purpose of separating the alcohol, is an important assistant to oak bark in the tanning process. After preparing skins in the usual manner, he placed them in the pits with the marc instead of bark. In thirty-five or forty days the tanning was finished. The expected advantrges are, 1st, shorter time; 2nd, reduction of the price of oak bark; 3rd, a more agreeable odour of the leather than that given by oak bark; 4th, greater strength in the leather.—*Recueil Indus.*

DEFENCE AGAINST FLIES.—It is said that the butchers of Geneva have for a long time used the oil of laurel as a substance which prevents the flies from approaching their meat. The odour of this oil, though strong, is not very disagreeable, and the flies will not approach the walls or parts which have been rubbed with it. The person who describes these effects says, that he has in this way guarded the gilt frames of mirrors and pictures perfectly free from flies.—*Ibid.*

OIL CLOTHS.—On the 23rd of May M. Chevalier pointed out a very simple method of removing the unpleasant smell which has hitherto militated against the use of oiled or varnished cloths and stuffs. It is merely to expose them to the action of a chloric fumigation in a close room.

NEW THEORY OF CAPILLARY ACTION.—M. Poisson has published as a paper the first part of a work which will shortly appear, and in which he gives his view of capillary attraction. After viewing what had been done before, he arrives at the conclusion that the phenomena of capillarity are due to molecular action, modified not only by the curvature of the surfaces, as Laplace has said, but also by the particular state of the liquids at their extremities due to the deficiency on the exterior of that molecular attraction which exists in the interior.—*Ann. de Chimie.*

NEW ARTILLERY.—A custom-house officer at Milan, of the name of Console, has invented a machine which entirely supersedes, in the artillery, the matches, &c. necessary for the discharge of cannon, and does the same service in all weathers, by night or by day, and and at the same time precludes all the dangers to which men loading guns are frequently exposed in the field, from too great haste or carelessness in the use of those burning substances. It has the advantage that the enemy perceive nothing till the piece is discharged, that the firing is more rapid, (one shot every four seconds); and, what is peculiarly worthy of attention, the saving of expense, in comparison with other modes of firing, is very great. The machine consists of an iron cylinder, within which there is a ramrod; which being drawn and pressing on a case, or cap, in front, with fulminating powder, recoils with great force, and thus effects the discharge of the piece. The importance and the ingenuity of the contrivance are in the case. The secret is known to nobody, and the inventor will not disclose it

till his improvement is adopted by the artillery in general. The machine is so light, that one man can use it without inconvenience like a common ramrod; at the same time it is so durable that 5000 shot may be fired in succession without weakening its power. The experiments fully satisfied all those who witnessed them.—*Foreign Journal.*

LIST OF NEW PATENTS SEALED.

FUEL.—To Lieut. H. L. Maw, of Southmolton Street, for an improved method of using fuel so as to burn smoke.—Dated July 20, 1831.—Specification to be enrolled in six months.

PIANO FORTES.—To W. Allen, of Catherine Street, Strand, piano forte maker, for improvements on piano fortes.—July 20, 1831. Six months.

NAILS.—To W. Church, of Heywood House, Birmingham, for improvements in machinery for making nails.—July 27, 1831.—Six months.

HOODS.—To J. Bance, of Moscow Cottages, Bayswater, gentleman, for an improvement in the construction of heads, or hoods, for cabriolets, gigs, and other open carriages, whereof the hoods are required to fold down behind the back of the seat when out of use. Communicated to him by a foreigner.—July 27, 1831.—Two months.

SUGARS.—To M. Robinson, of Westminster, navy-agent, on behalf of Lieut. W. A. Archbald, R. N. residing at Louisiana, in America, for improvements in the making and purifying sugars.—July 27, 1831.—Six months.

LOCKS.—To J. Young, of Wolverhampton, locksmith, for improvements on locks and latches, and the construction of the interior and exterior parts thereof.—July 27, 1831.—Six months.

HOT AIR.—To A. M. Perkins, of Harper Street, Middlesex, civil engineer, for improvements in the apparatus of heating air in buildings, heating and evaporating fluids, and heating metals.—July 30, 1831.—Six months.

PROPELLING.—To Sir J. Anderson, bart., for improved machinery for propelling vessels on water, applicable also to other purposes.—August 2, 1831.—Six months.

PAPER.—To J. Hall, the younger, of Dartford, engineer, for improvements in machinery and in the manufacture of paper. Communicated to him by a foreigner.—August 3, 1831.—Six months.

PROPELLING.—To A. Cochrane, of Norton Street, Middlesex, esq., for improvements in machinery for propelling locomotive carriages, and giving motion to mills and other machinery.—August 10, 1831.—Six months.

DRAWING.—To J. M. E. Ardit, of Newman Street, Middlesex, printer, for an apparatus for drawing, and for copying and reducing drawing and other objects or subjects, and for taking panoramas. Communicated to him by a foreigner.—August 10, 1831.—Two months.

AXLE-TREES.—To W. Mason, of Margeret Street, Cavendish Square, patent axle-tree maker, for improvements in the construction of wheel carriages.—August 10, 1831.—Six months.

MILLS.—To D. Selden, of Liverpool, merchant, for improvements in metallic mills for grinding coffee, corn, drugs, paints, and various other materials. Communicated to him by a foreigner.—August 11, 1831.—Six months.

MUSIC.—To A. W. Gillett, of Birmingham, merchant, for a new or improved machine to measure, beat, and give the accents in all the different modes of time, with any degree of velocity required applicable to the teaching of music. Communicated to him by a foreigner.—August 13, 1831.—Six months.

PATENTS ENROLLED BETWEEN 10TH AUGUST, AND 10TH SEPTEMBER, 1831.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

LACE MACHINES.—To Thomas Bailey, of Leicester, Frame Smith, and Charles Bailey, of the same place, also Frame Smith, a patent for "certain improvements in machinery for making lace, commonly called bobbin-net," was granted on the 15th of February, and the specification was deposited in the Rolls Chapel Office on the 11th of August, 1831.

This invention consists in certain variations in the constituent parts of a *Lever's Machine* for making lace, and chiefly relates to the dispensing with the use of the pushers and pushing bars, and the appendages in connection with the dividing tackling, for which are substituted compound catch bars, which serve the offices of both of the before mentioned apparatuses. A second claim of invention consists in the application of a series of thin pieces of metal to the lead of a comb, which are employed in conducting and keeping the bobbin carriages from shifting out of their proper positions, owing to the vibrations of the machine when in rapid action. The construction, adaptation, and mode of working with these improved arrangements could not be intelligibly described without reference to elaborate drawings, which as we have not space for, we are obliged to refer the reader desirous of more information on the subject, to the enrolled specification.

LOOM.—To Claude Guillotte, of Crispen Street, Spitalfields, London, Machine Maker, a patent for "an improvement in the rack applicable to the battons of looms, or machinery for weaving plain or figured ribbons," was granted on the 11th of February, and the specification was deposited in the Enrolment Office on the 11th of August, 1831.

This invention, which is partly the communication of a foreigner, consists of the substitution of leather for iron, in the racks by which the shuttles are actuated, applicable to the French batton ribbon loom. The advantages arising from the use of leather racks are, a saving of expense, as the first cost of leather racks will be considerably less than iron ones; and obviating the necessity for the use of oil in the racks and pinions, by which they are actuated, and by this means, the danger of injuring the

silk which the loom is to be employed in weaving, by the oil or other lubricating material which may be used dropping upon it, or otherwise coming in contact with it.

Fig. 1, Pl. XIII. represents the parts of a loom to which this improvement applies, where *a a* shows a portion of the batton; *b b* two of the shuttles, with leathern racks *c c*, an elevation of which is shown on a larger scale B, their lower sides being glued into grooves. These racks are acted upon by the pinion *e e*, which are made to alternate by the reciprocating motion of the leathern rack *f f*, glued on the upper side of a rod of wood, which is provided with an iron plate on its lower side, to rest upon the friction rollers *g g*, in the usual manner. This long rack is put in motion by the toothed wheel *h*, on the axis of which is fixed a drum *i*, and round this drum coils a cord, whose ends, after being passed round two guide pulleys, to turn them at right angles to their first direction, are attached to a pair of treadles, to be operated upon in the manner usually adopted for giving motion to the shuttles of the ribbon loom.

TYPES.—To James Thompson, of Spencer Street, Goswell Road, London, Gentleman, a patent for "certain improvements for making or producing printing types," was granted on the 14th of February, and the specification was lodged in the Enrolment Office on the 13th of August, 1831.

The process of type founding has become, from the great quantity of printing required, an important branch of manufacture; any plan for shortening or improving this process is therefore likely to obtain attention, and, if found to answer, to obtain patronage. The usual plan is, to have a separate mould of the required form and size, and to cast each letter by itself: this though a plan calculated to produce perfect letters, is evidently a tedious process; and Mr. Thompson, with a view to facilitate it, proposes to cast a large quantity of letters in one plate, similar to the stereotype plates, on the upper surface, and of a depth to correspond with the usual length of types. The letters are then to be separated by sawing, either with a circular or rectilineal saw. The patentee states, that the patterns can be obtained either by setting up common types and taking a plaster cast from them, as in stereotype casting, or else by forming the pattern letters by punching, and then taking casts from them in the usual manner. In both cases it is necessary to have the pattern letters so far apart as to admit of a saw-calf between them, without affecting their assigned form and dimensions.

We fear Mr. Thompson has not reflected sufficiently on the difficulty, of sawing a thick plate of type metal, with perfect precision, and of the necessity there is for having the stems of all the types precisely of corresponding dimensions, to secure the regularity of the lines when they are locked into the form by the printer.

BRIDLES.—To John Phillips, of Arnold, in the county of Nottingham, Servant-man, a patent for "certain improvements in bridles," was granted on the 21st of February, and the specification was lodged in the Rolls Chapel Office on the 21st of August, 1831.

The intention of the patentee is, to provide a powerful means of checking the impetuous and wayward motions of restive horses, both in riding and driving. To an ordinary snaffle bridle he adapts on each side of the horse's head two small pulleys, one near to the ears, and the other near to the mouth; through these are reeved a line, formed of a rounded strap, one end being attached to the external ring of the bit, and the other (after passing round the sheaves of the pulleys) attached to a distinct rein, which the patentee calls the safety-rein, as it affords by its accumulation of power, efficient means of arresting the motions of the animal.

A sketch of this apparatus is given at fig. 2, Pl. XIV. *a* being the upper pulley, covered by a rosette, and attached to the head stall of a common snaffle bridle; *b* the lower pulley, connected by a short strap and link plate to the ring of the bit: the safety rein is buckled at *c* to a short strap proceeding from the lower pulley, whence passing round both pulleys, as shown at *d e f*, it is connected to the flat strap *g*, which being pulled by the hand, has a tendency to draw the two pulleys towards each other; and consequently to operate very powerfully upon the mouth of the horse.

To adapt the principle of this invention to a led horse, an arrangement of three pulleys, similar to that shown at fig. 2, Pl. XIV. is employed, where *h h* represents the safety rein.

The claim of invention consists, in the application of pulleys to the reins and bridles of horses employed in riding or driving.

NAILS.—To R. Prosser, of Birmingham, Civil Engineer, a patent for "improvements in the manufacture of nails or tacks, used for ornamenting boxes and other articles of furniture," was

granted on the 13th of July, 1831, and the specification was enrolled in the Rolls Chapel Office on the 12th of September, 1831.

The object presumed to be accomplished by this invention is, the fabrication of those convex headed nails used chiefly for the purposes mentioned in the title, so as to reduce their cost of manufacture, and render them less liable to be broken in driving. The manufacture of this patent article indeed affords a very striking illustration of the wonderful facilities which the Birmingham manufacturers have attained in the working of metals to any required forms; here are small nails or tacks, made of three distinct pieces of metal, each piece of a different form, effected by different machines or processes, and combined by other machines; yet produced at a less expense than the simple cast brass nails, and although the latter are rendered at a price *very* little more than the value of the unworked metal!

The common brass nails have, however, a great defect; that of bending or breaking in the shank, upon being driven, owing to the softness or brittleness of the alloy. To remedy this defect Mr. Prosser makes the shanks (by preference) of iron wire, of the form represented at fig. 4, Pl. XIV. which is effected by a stamping press. (These may however be forged or cast, if so required.) The brass head is produced by first cutting out of thin rolled metal, circular discs, of the sizes required, then compressing the discs between dies into the cup form, shown at fig. 5. The next operation is to turn down the periphery or edge of the cup, as seen at fig. 6. To connect these last to the iron shank, an intermediate brass shell, of the form shown at fig. 7, is stamped out, through the centre hole of which the iron shank is put, and being then inserted together, into the cup, fig. 6, the edges of the latter are brought closely into contact by pressure, in the manner shown by the section fig. 8: thus is produced a wrought brass headed nail with an iron shank, (as seen at fig. 9) of equal beauty, greater strength, and at a less cost than a nail of cast brass!

The under shell (fig. 7) would not be required if the iron head of the shank could be spread out sufficiently to fill up the space in the cup; but we question much whether this operation would not be attended with more labour and expense than the introduction of the separate piece of metal.

As many of our readers will no fail to remark, that various articles of brass-work have hitherto been made by a similar pro-

cess and arrangement of parts to the foregoing, we have only to observe, that the novelty consists in their useful application to this particular object.

EVAPORATING BRINE.—To William Furnivals, of Wharton, in the county of Chester, Esq. a patent for "certain improvements in evaporating brine," was granted on the 21st of February, and the specification was lodged n the Enrolment Office on the 20th of August, 1831.

Mr. Furnivals's improvements in evaporating brine, are represented by fig. 4, Pl. XIII. where *a a* shows a vertical transverse section of an evaporating vessel, with four triangular pipes *b b b b*, extending all the length of the vessel. These pipes are intended to communicate heat, by the passage of steam, hot-air, or hot-water, through them, and they are made triangular to prevent the salt from being deposited on their surfaces. Over the evaporizing vessel is placed an angular roof *c c*, made double, for the passage of the brine, which is received through the pipe *e*, and admitted through the stop cock *f* into the evaporating vessel, after having been heated by the steam arising from the brine already in the vessel. The steam coming in contact with the under side of the angular roof is condensed, by the transfer of its heat to the fluid within the roof, and the distilled water descending along the sloping sides of the roof is received into, and conveyed away by the gutters or troughs *d d*.

The judicious arrangement of this apparatus renders it well deserving of the attention of parties interested in the manufacture of salt.

HEATING APARTMENTS.—To Richard Trevithick, of Saint Aith, in the county of Cornwall, Engineer, a patent for "a method or apparatus for heating apartments," was granted on the 21st of February, and the specification was deposited in the Enrolment Office on the 20th of August, 1831.

We have frequently had occasion to notice in terms of approbation, methods of warming apartments through the medium of hot water circulating through them in pipes. The water when heated, proceeding from the upper part of the boiler or vessel in which the heat is communicated, and giving out its heat where it it is made to return and re-enter the boiler, near its lower part. Mr. Trevithick to get the advantages of water as the medium of transmitting the heat from the fire to the apartments to be heated, without the extensive and costly fittings required for the above

plan, designed a plan of surrounding a portable furnace with a hot water chamber, as represented by fig. 2, Pl. XIII. where *a a* shows the water chamber; *b* the fire-place, *c* the ash pit; *d* an inner furnace door; *e* an exterior door, enclosing both fire-place and ash pit, and *f* is a flue, which can be removed at pleasure. A plug or safety valve is provided at the top of the water vessel, for the supply of water and the escape of steam. When this apparatus is to be used the flue *f* is made to connect it with a chimney, and fuel is applied in *b* till the water in *a* boils. The flue is then removed from the apparatus, and the opening where it was connected closed, as well as the door *e*, and the apparatus being supported on small wheels or castors, is moved into the apartment to be heated, or it may be heated in the place where it is required to be used, if there should be the means of connecting it with a chimney. It will then continue to give out heat till the water is reduced from 212° to the temperature of the room, this will occupy several hours, and then, if necessary, the water may be raised to the boiling point again. When churches or other large buildings are to be heated by this means, a cylindrical form and considerably higher than the above is to be employed. This form of the apparatus is represented by fig. 3, Pl. XIII. where *a* shows the fire grate; *b b* the boiler or water chamber, *c c c* a series of vertical air pipes, passing up through the water to increase the heat radiating surface. The air in these pipes will naturally ascend as it becomes heated, and consequently there will be a constant circulation of air through them, which will facilitate much the diffusion of heat through the apartments.

This is certainly a very neat and wholesome method of communicating heat to apartments, and where circumstances admit of the apparatus being heated in the place where its heat is required, it cannot fail to prove an economical plan, particularly in places where heat is only required for a few hours at a time.

STEAM ENGINE.—To Richard Trevithick, of St. Aith, in the county of Cornwall, Engineer, a patent for "an improved steam engine," was granted on the 21st of February, and the specification was lodged in the Enrolment Office on the 20th of August, 1831.

The improvements described in this specification refer to the boiler as well as to the engine; and have for their object, the saving of fuel by the judicious application of heat, the saving of room by the compactness of structure, and the saving of danger

from the proportionate strength of different parts, and the disposition of the boiler and its appurtenances.

These objects are proposed to be obtained by an apparatus consisting first, in a circular fire place and flue made of a strong conical piece of iron placed with its narrowest end upwards, with a fire grate and ash pit within its base; over this is placed a cylinder of considerably larger diameter; and these two being united at top and bottom constitute the steam boiler. Over this is placed another cylinder of somewhat larger diameter, having a space between it and the boiler for the reception of charcoal powder, or other slow conducting material. Exterior to this is placed another cylinder of still larger diameter, having a space between it and the last sufficient to constitute a condenser. And exterior to this is placed another of a diameter sufficient to leave a space for the passage of cold air or cold water, for the purpose of effecting the condensation of the steam when admitted into the condenser. The working cylinder, or cylinders, if two be employed, are fixed to this outer casing, and provided with double communications from the boiler and to the condenser, having valves or cocks of the usual construction, for the admission and escape of the steam.

The steam having performed its work in the cylinder is allowed to escape into the condenser, which being surrounded with a current of cold air or cold water passing down through the air vessel it becomes converted again into water, without the admixture of any additional water; and the steam being thus converted into water is returned into the boiler by a forcing pump: and thus, the same water continuing to be used, distilled water can be used, and no deposit salts can take place in the boiler. The only addition of water required after the apparatus is once supplied and set to work, will be to make up for any accidental leakage or escape of steam; and this will be so trifling as to render the supply of disstilled water for the purpose easily obtained from a small distilling apparatus surrounding the flue above the boiler. The cold air is supplied to the condensing air vessel by means of a blowing apparatus, and thence conveyed through the fire for to support the combustion.

The security against explosion is obtained by the boiler being surrounded as above described. If it should burst inwards, the steam will escape harmlessly up the chimney and through the fire door; and if it should explode outwards, its force will be first weakened, by being dissipated through the stratum of char-

coal powder: and should the outer casing of the non-conducting chamber be insufficient to resist the explosive force of the steam it will get expanded and weakened by passing into the condenser; and should the outer casing of the condenser likewise give way, it can only pass into the air chamber, where it will be still more expanded and weakened, and finally resisted by the strong exterior casing which includes all the chambers.

The novelties of this invention are the compact arrangement of the different parts of the operation of condensation, without the admixture of additional water, the return of the condensed steam into the boiler again, and the supply of air to the fire from the condensing air chamber.

DISSOLVING SNOW OR ICE ON RAILWAY.—To Jeremiah Grime, the younger, of Bury, in the county of Lancaster, Copper-plate Engraver, a patent for "a certain method of dissolving snow and ice on the trams or railways, in order that locomotive steam engines and carriages, and other carriages may pass over rail-roads without any obstruction or impediment from such snow or ice," was granted on the 21st of February, and the specification was deposited in the Enrolment Office on the 20th of August, 1831.

The object of this invention is clearly pointed out in the above title; and it is proposed to be effected by making the rails hollow, and causing hot water, steam, or hot air to pass through them, so as to keep them at a temperature above the freezing point. For this purpose it will be necessary to have a boiler erected by the side of the rail-road, at distances of two or three miles from each other. One of these boilers being supplied with water and heat applied, the water is forced, by the pressure of steam on its surface, through a pipe communicating with the hollow rail, and and reaching nearly to the bottom of the boiler, and along the railway, till it ceases to give out a sufficient quantity of heat to melt the snow or ice which may lodge on the rails, when the water is received into another boiler by means of a feeding vessel placed over it. This feeding vessel is connected with the boiler by two pipes: the one descending from its bottom to very nearly the bottom of the boiler, to form a water communication, and the other from its top to the top of the boiler, to form a steam communication. Each of these communications is provided with a stop-cock and levers; from both of which, as well as one from a cock on the pipe which supplies the feeding vessel, are connected with

a float in the boiler by means of a wire passing through a stuffing box, in a manner similar to that patented in July, 1830, by William Taylor, of Wednesbury, and described in the 5th vol. of the present series of the *Register of Arts*, page 293, where the float descends by the escape of water through the exit pipe into the rails: the steam and water communication from the feeding vessel to the boiler are thereby opened, while the supply pipe to the feeding vessel is closed, when the water contained therein is forced by the pressure of steam on its surface, into the boiler, till the float is elevated so as to close the communications between the feeding vessel and the boiler, and to open that between it and the hollow rails, for the admission of a fresh supply of cooled water.

It is stated in the specification, that instead of the hollow rails, hot water pipes may be laid along the line of road, in contact with rails of the usual construction. The lengths of hollow rail are connected together by pieces of copper pipes fitting accurately into the ends of the pieces of hollow rails, which they unite, leaving a space between them sufficient to allow of their expansion by the increased temperature.

STEAM ENGINES.—To Richard Williams, of College Wharf, Belvidere Road, Lambeth, Surrey, Engineer, a patent for "certain improvements in the steam engine," was granted on the 28th of February, and the specification was deposited in the Enrolment Office on 27th of August, 1831.

These improvements are described by the patentee, to consist of a fly wheel so connected with the engine, working by expansion, as to make two revolutions for every stroke of the piston, and so loaded on one side that the diminished force of the steam towards the end of each stroke of the piston shall be compensated for by the descent of the loaded part of the fly wheel, and the ascent of the loaded part will be effected during the first period of the piston's motion, when the steam is acting with the greatest force.

STEAM ENGINES.—To William Morgan, of York Terrace, Regent's Park, Esq. a patent for "certain improvements in steam engines," was granted on the 14th of February, and the specification was deposited in the Enrolment Office on the 13th of August, 1831.

These improvements are intended to apply to a semi-rotatory engine patented by Mr. Elijah Galloway, in July, 1829,

and described in the 4th vol. page 193 of the *Register of Arts;* the patent-right of which is stated to have been assigned to the present patentee. They consist of several methods of converting the alternating action of the semi-rotatory motion of the axis of Galloway's engine into a continuous and uniform rotatory motion, which will be understood by reference to the diagrams, figs. 10, 11, 12, 13, Pl. XIV., in all of which *a* represents the axis of the steam engine, and *b* the axis of the fly wheel to be put in motion. *a c* is a crank fixed upon the engine axis, and *b d* a crank fixed upon the fly wheel axis in figs. 11, 12, 13. *c d* is a rod connecting the two cranks in fig. 10, and *g d* the connecting rod in fig. 13. *e c f* shows the arc of semi-rotation of the engine crank in all the figures. In fig. 10 two chains *h h*, *k k*, are attached to the connecting rod, and carried partly round a drum fixed on the axis of the engine; and by this means the motion of the engine is transferred to the crank of the fly wheel. In fig. 11 an anti-friction roller is placed on the extremity *c* of the engine crank, and works in a slot in the end of a vibrating beam *c l;* and this beam transfers its motion to the fly wheel by means of the connecting rod *l d*. The same action occurs in fig. 12, except that the anti-friction roller is connected with the end of the vibrating beam *c l*, and works in a slot in the engine crank *a c*. In fig. 13 two other rods are introduced instead of the friction roller moving in a slot. These are *g c* which unites the crank *a c*, and the end *g* of the rod *g d*, and a radius rod *m n* turning on a stationary centre *m*, and connected with the middle of the rod *g c* by a moveable joint at *n*. The continuous lines show the position of the levers at the middle of a stroke of the engine, and the dotted lines shew their position at the beginning and end of a stroke, by which it will be perceived that the motion of the point *g* will be very nearly rectilineal. A fifth method of communicating the motion to the fly wheel is described to be similar to that of fig. 1, except that in it anti-friction rollers are introduced to guide the motion of the end *c* of the connecting rod *c d;* and it is stated that a rack and pinion may be substituted for the chain and drum.

SPINNING.—To D. Seldon, of Liverpool, Merchant, a patent for "improvements in machinery used to give a degree of consistency to, and to wind on to bobbins, barrels, or spools, rovings of cottons, and the like fibrous substances," was granted on the 26th of February, and the specification was enrolled in the Enrolment Office on the 25th of August, 1831.

The method adopted by this patentee for giving a consistency to rovings, is to cause the rovings, after passing a series of drawing rollers of the usual construction, to pass between two flat pressing surfaces, which are made to move in different directions at right angles to the direction in which the rovings move. The pressing surface are furnished with endless bands made of leather, or other suitable flexible material with rough surfaces. These endless bands are mounted with a pair of rollers situated above, and a pair below the rovings, and the frames in which these rollers move are furnished with a rack for each pair, having a toothed wheel placed between to act upon both racks. From this toothed wheel projects an arm or lever which is connected by a link with a small crank on the driving shaft, which will communicate to the toothed wheel an alternating motion, causing the upper pressing frame to move in one direction while the under frame is moving in another; so that the rovings are first twisted in one direction and then in another, while subjected to considerable pressure; and thus a compactness or consistency is given to them without leaving them at all twisted. The rovings are drawn along between the pressing surfaces by means of both leather bands moving in the same direction; which motion is effected by causing the rollers over which they pass to move in contrary directions by bands from the main shaft, or other moving parts.

The rovings are then to be conveyed to, and wound upon bobbins or spools, in the usual manner; but each bobbin or spool is provided with an apron which presses the fibrous substance against the bobbin as it is wound, to give it a compactness on the bobbin. The traversing arms, for distributing the rovings evenly upon the bobbins, and the methods of giving motions to the different parts of the machine, do not differ materially from those in common use; and therefore we have not deemed it necessary to give them more in detail.

MANGLES.—To J. L. Stephens, Auctioneer, and P. Waycott, Clock and Watch Maker, both of Plymouth, Devonshire, a patent for "improvements in mangles," was granted on the 22nd of June, and the specification was enrolled in the Rolls Chapel Office on the 25th of August, 1831.

The improvements of these patentees apply to the machines usually denominated Baker's mangles; or those in whi h a traversing of the mangle box is obtained by means of a pinion on the end of a vibrating axis, allowing it to pass over a horizontal rack

to move the mangle box in one direction, and under the rack to move in the contrary, while the pinion which gives motion to this vibrating axis is turned continually in the same direction. The proposed improvements consist of two methods of elevating one end of the mangle box for the purpose of introducing or removing the linen or other goods to be mangled. The method first described by the patentees consists in a piece chain attached to each end of the box, and provided with a strong iron pin, which fits into a hole in the axis, by which motion is communicated to the mangle. When one end of the box is to be elevated to introduce or release the roller, the chain at that end is brought under the axis and the chain pin into the hole for its reception, and then by turning the axis the end of the box is elevated. The other method of raising the box is by converting the rack beam into a lever; for raising the box, a bolt is introduced through the upright stands to constitute a fulcrum for the rack beam, which is to be attached to the box at one end and released from it at the other; and then by pressing upon it with the hand, the end of the box can be raised as high as necessary for the change of the linen rollers.

It is really difficult to discover in what these plans are superior to the common, simple, and efficacious plan of raising the end of a mangle box by causing its frame to ascend an inclined plane, which can be brought into operation, or removed out of the way when not required, with the greatest facility.

SULPHURIC ACID.—To Perigrine Phillips, Jun., of Bristol, Vinegar Maker, a patent for "certain improvements in manufacturing sulphuric acid, commonly called oil of vitriol," was granted on the 21st of March, and the specification was enrolled on the 15th of July, 1831.

The patentee states, that "for the better understanding of the subject, I shall first describe the present mode of manufacturing sulphuric acid,—next the improvements I propose to effect, and then the means by which these improvements are effected."

"Sulphuric acid, or oil of vitriol, is generally manufactured at present by the combustion of sulphur or brimstone and saltpetre, either mixed together and placed in large leaded chambers, or separately in ovens connected with these chambers; into which chambers more or less of atmospheric air is admitted. The sulphur at first is converted by the combustion into sulphurous acid gas, and then by the agency of nitrous gas, united with oxygen from the atmospheric air in the chamber, or from that liberated

from the saltpetre, and is thus converted gradually into sulphuric acid, and is afterwards absorbed by the water which covers the bottom of the chamber."

"The first improvement then which I propose to effect is, an instantaneous union of the sulphurous acid gas with the oxygen of the atmosphere, and thereby save the constant expense of saltpetre; and also the great outlay of capital in the chambers, where any great quantity of sulphurous acid can be manufactured by the gradual conversion of the sulphurous acid into the sulphuric acid."

"The second improvement I propose to effect, is to effect a more perfect condensation of sulphuric acid when made, by an improved mode of absorbing the same."

"The first improvement then, namely, the instantaneous union of sulphurous acid with the oxygen of the atmosphere, I effect by drawing them in proper proportions by the action of an air pump or other mechanical means, through an ignited tube or tubes of platina, porcelain, or any other material not acted on when heated, by the sulphurous acid gas. In the said tube or tubes, I place fine platina wire or platina, in any finely divided state, and I heat them to a strong yellow heat, and by preference in the chamber of a reverberatory furnace: and I do affirm, that sulphurous acid gas, being made to pass with a sufficient supply of atmospheric air through tubes, as described, properly heated and managed, will be instantly converted into sulphuric acid gas, which will be rapidly absorbed as soon as it comes in contact with water. The sulphurous acid gas, I cause to be generated by the combustion of sulphur or pyrites, or any other metallic sulphuret, in a close oven, having one or more apertures for the admission of atmospheric air, and another aperture leading to, or communicating with, the aforesaid tubes. The relative proportions of sulphurous gas and atmospheric air, are regulated by the size and working of the air pump; which must pump out at least eighty-five cubic feet of air for every pound avoirdupoise of sulphur consumed."

"My second improvement, namely, a more perfect condensation of the sulphuric acid when made, I effect thus:—I cause a chamber or chambers to be erected, of any size and materials that may be thought convenient; but by preference of silicious stone, in a circular form, and about eight feet in diameter, and thirty feet high; this I cause to be lined nearly or throughout with lead, to be filled nearly to the top with silicious pebbles, or any sub-

stance presenting an extensive surface, and not acted upon by the sulphuric acid. Upon the pebbles, or other substances, I place a piece of lead, pierced with small holes for the better distribution of the liquor to be hereafter mentioned. The chamber is to be domed over and rendered air-tight on the outside, except by an opening on the top, through which a quantity of water, or dilute acid, is let in on the pebbles to the height of about fourteen inches. A lead pump is fixed by the side of this chamber, drawing the liquor from its bottom, and emptying its contents into a lead funnel placed in and over the aforesaid opening in the top of the dome, and which said pump is kept constantly worked by a steam engine, or any other power that may be preferred. The pipe of the funnel must be of such a size as always to keep some liquor in the funnel, and never to allow any air to pass down that way into the chamber; and the pump must throw a sufficient quantity of liquor to keep all, or the greater part of the pebbles moistened. A pipe leading from the ignited tube or tubes, after passing through some water for the purpose of cooling it, terminates in this chamber just above the top of the liquor; whilst another pipe going off from the top of the chamber leads to the air pump: so that all the air charged with sulphuric acid has to pass through the bed of moistened pebbles, which have a constant supply of water, or dilute acid continually passing down them. When the liquor is considered sufficiently charged, or when it will not absorb the sulphuric acid gas, which may be known by examining the air discharged from the air pump, it is to be drawn off by a pipe and cock in the bottom of the chamber, and treated in the usual way."

"Note.—I do not claim a right to any mode by which sulphur or sulphurets may be converted directly into sulphuric acid by the action of heat or otherwise, if such method ever has been or ever shall be discovered: but I claim an exclusive right to any plan by which sulphurous gas and atmospheric air, either alone or mixed with any other gas or gases, shall be either forced or drawn by an air pump, or any other mechanical means, through an ignited tube or tubes."

"I also claim the exclusive right to the use of platina in any finely divided state, for the purpose of assisting the action of heat in combining sulphurous gas with oxygen, in the manufacture of sulphuric acid."

"I likewise claim an exclusive right to every mode by which chambers used in the manufacture of sulphuric acid can be

charged with silicious pebbles, or other substances, for the purpose of exposing extensive surfaces, and which surfaces can be either constantly or occasionally moistened by the liquor pumped or drawn from below them.

WHEELS.—To G. Stephenson, of Liverpool, Civil Engineer, a patent for "improvements in the mode of constructing wheels for rail-way carriages," was granted on the 30th of April, and the specification was enrolled in the Enrolment Office, on the 28th of August, 1831.

In 1816 a patent was taken out by Mr. G. Stephenson and Mr. Losh, for an improvement in carriage wheels, which consisted of casting cast-iron felloes and naves upon wrought iron spokes, and the present patent is for wheels of the same description, with spokes of hollow wrought iron, either made cylindrical or conical, according to the taste of the manufacturer, or the wants of his customers. In addition to the tubular form of the spokes, the patentee claims the application of borax, to glaze their ends, previously to the process of casting, by which the junction of the two metals will be rendered more perfect then could be obtained without the use of such a flux. The processes of glazing the ends of the spokes outside and inside with borax, is described to consist, first, in cleaning them well, moistening them, then spreading a coat of powdered borax over them, and then applying heat till they become glazed: or else in cleaning them, and by immersion into a hot solution of borax and water.

The construction of these wheels, and the general arrangement of the different parts, will be readily understood by inspecting fig. 5, Pl. XIII. where *a* represents the axis of the wheel, which is of cast-iron; *b* the cast-iron felloes, divided into three portions by the open spaces at *c c c*, to admit of the contraction of the metal on cooling, and thereby avoid the liability to breaking in the subsequent use; these spaces are afterwards wedged or keyed up, to make the whole firm as one piece. The tubular spokes *d d d* are made somewhat flattened or eliptical, as shown by the separate figure *c*, and are spread out at their ends, to secure them better together. *f* represents the flanged ring adapted to the rail-way.

SPINNING.—To S. Lambert, of Regent Street, Middlesex, Gold-lace-man, a patent for "an improvement in throstle-spindles for spinning and twisting silk, cotton, wool, flax, and other fibrous substances," was granted on the 2nd of June, and the spe-

cification was enrolled in the Enrolment Office on the 2nd of September, 1831.

The intention of this patent is to render the motions of the bobbin and flyer more steady than their motions can be obtained by the usual arrangement. This steadiness of motion is obtained by having the frame which carries the bobbins independent of the frame which carries the flyer; the former being placed over the latter. By this means the long spindle of the flyer which carries the bobbins in the machines as they are usually constructed, are dispensed with; and hence arises the additional steadiness of their action, and a facility in exchanging the bobbins. The bobbin frame has an alternating vertical motion, which is obtained in the manner usually adopted for distributing evenly the strands on the bobbins; each flyer being provided with a bobbin over its centre of motion, which ascends and descends within it without the two ever coming in contact.

PROPELLING.—To D. Napier, of Warren Street, Fitzroy Square, Engineer, and J. Napier and W. Napier, of Glasgow, a patent for "improvements in machinery for propelling locomotive carriages," was granted on the 4th of March, and the specification was enrolled in the Enrolment Office on the 30th of August, 1831.

The novelties claimed in this specification are the applications of straps or bands of leather, or other suitable material, running on drums, to transfer the motion from a crank shaft immediately in connection with the engines to the wheels of the carriage, and and also some modifications of the construction and position of the steam boilers, which will be best understood by reference to fig. 6. Pl. XIII.

The diagram, fig. 6. represents a plan of the principal arrangements of the carriage alluded to. *a a* are the boilers, *b* steam pipe communicating with the valves of two horizontal working cylinders *c c*, whose piston rods are, by intermediate rods, connected to two cranks *d d*, placed at right angles to each other, on a shaft *e*, which carries a drum *f*; round this drum is a strap *g g*, which passes under the body of the carriage, and is continued round another drum *h*, on the shaft *i* of the hind running wheels; the power of the engines is thus communicated by a strap to the impelling wheels of the carriage; the fore-wheels and axle *k k* are guided by means of a cross handle, from which a vertical shaft descends, having a pinion at its lowest extremity which takes into a toothed sector, fixed to the axle in the usual manner. As the

strap constitutes the only claim to invention in the carriage, we have not thought it necessary to make a more extended drawing; and it is to be regretted that the patentee should have been so ill advised as to take out a patent for what almost every person who has attended to locomotive machinery is quite familiar with.

The boiler, which constitutes the second claim of invention, is sketched at fig. 7. Pl. XIII., which represents a vertical section of one of the boilers shown on the plan fig. 6.; *l* is the fire-place, contained in a central tube, which proceeds to the hemispherical end of the boiler, (better seen at *m m*, fig. 6.); the smoke then returns by the pipes *n n*, through the water *o*, and thence conveyed to the chimney.

LIGHTNING CONDUCTORS IN SHIPS.

We make the following extract from a very interesting and valuable paper by W. S. Harris, Esq., member of the Plymouth Institution, inserted in the last number of Jameson's Edinburgh Journal.

"Although the application of lightning-conductors to buildings on shore is always judicious, and their advantages very apparent, yet on ship-board, where the effects of lightning are most to be dreaded, the introduction of this means of defence has been slow and imperfect. The conductor hitherto employed at sea consists of long flexible chains or links of metal, about the size of a goose-quill, sometimes of iron: those employed in H. M. Navy, however, are of copper; they are usually packed in a box, and are intended to be set up from the mast-head to the sea when occasions require, so that, as observed by Mr. Singer, in his excellent work on electricity, partly from inattention, and partly from prejudice, they frequently remain in the ship's-hold during long and hazardous voyages quite unemployed; a remark, the truth of which is but too frequently verified in the damage so constantly happening at sea during lightning storms.

The necessity of providing the best possible security against the effects of lightning on ship-board has been long admitted; but continuous and fixed metallic rods have been deemed inapplicable to ships, in consequence of their masts, the only parts to which they can be attached, being exposed to chances of injury, to motion in a variety of ways, to frequent elongation and contraction, and to the necessity which frequently arises for removing the higher masts altogether, and placing them on deck. It was probably from these causes that the small flexible chains or links above mentioned were employed. Such con-

ductors, however, will probably, on examination, be found less applicable than fixed continuous lines of metal, and, in every point of view, inefficient substitutes for them. Their great want of continuity, as well as their want of mass and surface, is very unfavourable to the transmission of severe explosions, the electric matter becoming sensible at the points of junction, as is evident by the sparks which appear upon them at the time of the discharge, so that in some instances they have been actually disunited: they are likewise objectionable as being liable to every species of injury incident to a ship's rigging, and much difficulty is experienced in keeping them in their position, and unbroken, more especially during gales of wind, and at night, when the ship is under sail, and when it is perhaps required, as is already observed, to remove some portion of the higher masts. It has therefore been long considered desirable to apply, if possible, a permanent conductor, which should be always in its place, and ready for action; and various attempts have been made and suggestions advanced, at different times, to apply fixed lightning-conductors in ships, as the subject from time to time has demanded further consideration.

To protect a ship effectually from damage by lightning, it is essential that the conductor be as continuous and as direct as possible, from the highest point to the sea—that it be permanently fixed in the masts, throughout their whole extent, so as to admit of the motion of one portion of the mast upon another; and in case of the removal of any part of the mast, together with the conductor attached to it, either from accident or design, the remaining portion should still be perfect, and equivalent to transmit an electrical discharge into the sea.

To fulfil these conditions, pieces of sheet-copper, from one-eighth to one-sixteenth of an inch thick, and about two feet long, and varying from six inches to one inch and a half in breadth, may be inserted into the masts in two laminæ, one over the other; the butts or joints of the one being covered by the central portions of the other. The laminæ should be rivetted together at the butts, so as to form a long elastic continuous line; the whole conductor is inserted under the edges of a neat groove, ploughed longitudinally in the aft side of the different masts, and secured in its position by wrought copper nails, so as to present a fair surface. The metallic line thus constructed, will then pass downward from the copper spindle at the mast-head, along the aft sides of the royal-mast and top-gallant-mast, being connected in its course with the copper about the sheeve-holes. A copper lining in the aft side of the cap, through which the top-mast slides, now takes up the connection, and continues it over the cap, to the aft side of the top-mast, and so on as before, to the step of the mast. Here it meets a thick wide copper lining, turned round the step, under the heel of the mast, and resting on a similar layer of copper, fixed to the keelson. This last is con-

nected with some of the keelson bolts, and with three perpendicular bolts of copper, of two inches diameter, which are driven into the main keel upon three transvere or horizontal bolts, brought into immediate contact with the copper expanded over the bottom. The laminæ of copper are turned over the respective mast-heads, and secured about an inch or more down on the opposite side; the cap which corresponds is prepared in a somewhat similar way, the copper being continued from the lining in the aft part of the round hole, over the cap, into the fore part of the square one, where it is turned down and secured as before, so that when the cap is in its place, the contact is complete. In this way, we have, under all circumstances, a continuous metallic line, from the highest point to the sea, which will transmit the electric matter directly through the keel,* being the line of least resistance.

"From what has been already observed, it will be apparent, that in whatever position we suppose the sliding-masts to be placed, whether in a state of elongation or contraction, still the line of conduction will remain perfect, for that part of the conductor which necessarily remains below the cap and top, when the sliding-masts are struck, is no longer in the line of action, consequently its influence need not be considered."

STEAM CARRIAGES.

We have been requested by a much respected foreign correspondent, to give some account, through the medium of our "Register," of the present state of the art of applying the power of steam to propel carriages on the common road; and it is with regret we have to state that very little progression has been made therein since our pages teemed with numerous plans and experiments of the rival competitors about two or three years ago. Although we have never doubted for an instant, that steam power will ultimately become a cheaper power *than horses* on the road, we are inclined to believe that some years more will elapse before it will be accomplished. It has happened that many of the schemes which are proposed for this purpose have emanated from men, who however ingenious, have had very little practical experience in the construction of mechanism, and their plans have unfortunately, for the most part been executed by mechanics who have either not been duly sensible of the necessity of solid and accurate workmanship, or they have been incapable of performing it. Owing to this circumstance much time and money have been

* Since the mizen-mast does not step on the keelson, it will be necessary to have a metallic communication at the step of the mast with the perpendicular stancheon immediately under it, and so on to the keelson as before, or otherwise carry the conductor out at the sides of the vessel.

most unprofitably employed in attempting to bring into operation some of the best propositions in locomotion.

On the other hand, when experienced and clever engineers have been employed, the plans they have had to work upon have generally been exceedingly crude or ill devised. In this manner very large sums have been made "ducks and drakes" of: and in the recent attempt to establish a steam coach between Cheltenham and Gloucester, the expense to the proprietors, we are given to understand, was double or treble that of the ordinary expense of horsed coaches. Notwithstanding this fact, which is easily susceptible of proof, a very different statement has been laid before the committee of the House of Commons which is now employed in investigating the economy of this important project.

The statement we allude to were made by Mr. Goldsworthy Gurney, in which he makes an estimate of the comparative expense of steam and horse power in travelling a line of 100 miles of road, up and down per day, or 200 miles in the whole: for this work he states (and we believe correctly) that 100 horses are required, which valuing at £25 each horse, makes an outlay of capital for horse power of £2500; and he calculates that this work may be performed by three steam carriages, costing £500 each; thus requiring a capital of £1500 only; or £1000 less for steam power than for horse power. We consider that Mr. Gurney is not far from the truth in this part of his calculation; but we question his correctness when he estimates that *his steam carriages may be worked at one-fifth of the expense of horsed carriages:* because if this were the case, he or his partners must have been getting money very fast at Cheltenham, instead of being tired out (as we are informed) of *losing* money in an unpromising speculation. The inquiry instituted by the House of Commons will be comparatively useless if it omit an investigation into the expenditure and other circumstances of the long continued experiment at Gloucester and Cheltenham, and substitute for it the loose and unproved assertions of individuals who are interested in the result of the investigation. If the Legislature be called upon to alter the laws in favour of steam carriages on the ground of their superior economy, it is at least incumbent on the parties applying for such alteration, to prove their case by an unreserved exposition of all the facts relating to it. Now it does appear to us, that the real and most important facts, as experimentally proved on the Cheltenham road, have not been inquired into. Not that we think the experiments of Mr. Gurney should decide the question of the eligibility of steam carriages, as there are many other men who have experimented with steam coaches both antecedently and subsequently to Mr. Gurney, who possess at least as much skill and knowledge, and whose evidence therefore is equally deserving of consideration.

We have admitted that Mr. Gurney is probably correct in his view, that a less capital is required in the first establishment of a

steam coach, and that as respects the present current expenses we differ widely from him. He says that the wear and tear of horses is about £5 each per annum, which on the 100 horses employed is £500 per annum for wear and tear: and against this item he places the wear and tear of steam coaches, which he estimates at only £100 each per annum; that is £300 for the three coaches, or £200 less than the wear and tear of the same power in horses. Now it is very important that the committee should endeavour to ascertain from Mr. Gurney whether he founds this calculation upon the experience of the past, or his anticipations of the future. We suspect it must be the latter, as we have reason to believe that his experience has told him a very different tale; and as we are anxious to publish nothing but the truth, we leave it to the enterprizing and public spirited gentlemen who were concerned in the before-mentioned undertaking to correct us if we are wrong, when we say that the expense of the wear and tear of the steam power, instead of being less than the horse power, was much more;—and that the wear and tear of the *boilers alone* was three times as much as is stated for the whole carriage!

The comparative daily expense is thus estimated:—

The shoeing, keep, provisions, attendance, harness, &c. about 8s. per day, which upon 100 horses is £15.

The fuel for steam carriages half a bushel per mile travelled, which at 6d. per bushel is £2. 10s.

This makes steam only one-sixth the expense of horse power; but Mr. Gurney out of a due regard to moderation, states it to be only "one-fifth." The only way in which we can readily examine this estimate is, first to consider what a draught horse may be hired for at livery stables, which is about one guinea per week in London, (the dearest place in England); and as it must be presumed that the proprietor makes a living of such business, and that an allowance for wear and tear has already been considered in a separate item, we think we may estimate the cost safely at two shillings per horse per diem,—or £10 for the whole: against this we have to place the cost of the coke for the steam power, which is stated to be half a bushel per mile; but we have reason to know that an inquiry into the consumption at Cheltenham, will exhibit at least a bushel per mile, which at 6d. per bushel, is £5. This brings down the estimate to half the expense of horse power; and as the fact is notorious that the proprietors had determined to suffer no more losses, we may fairly suppose that the "wear and tear" before-mentioned added so greatly to the current expense, as to occasion them to abandon the undertaking.

Entertaining, as we severally do, such unfavourable views of Mr. Gurney's attempts at locomotion on the common road, it is right we should not withhold it from our friends who seek for information on the subject, and have not the same facilities of obtaining it.

We shall now proceed to give some further account of Mr.

Gurney's evidence, with as little comment as possible. He stated the boilers would last three years by fair treatment; that they required cleaning once a fortnight, or three weeks, which depends on the situations where they work; in some situations where lime is held in solution in the water in large quantities, they require cleaning oftener, but in other situations where there is very little earthy matter held in solution they will run for a month or two months.

There could not be any fair system of toll established by the length of stroke, and the area of the piston; because the length of stroke and the area of piston will give power in proportion to the pressure of the steam upon it; the apparatus for supplying or generating the necessary steam would vary considerably in weight in different engines; and therefore the weight of different engines would vary so much perhaps as three times or four times. There the toll, placed on an engine according to its greatest power of working, would be very difficult to ascertain its greatest power of working; it might be done, but it would be very inconvenient. Horse-power is very arbitrary; the best standard is the evaporation of water, and the evaporation of nine gallons of water in an hour ought to be equivalent to one-horse power. One engineer will apply the steam with more effect from nine gallons of water, and with more general advantage than another: nine gallons may be taken as an average. It does not follow in all cases that one-horse power will be practically produced from nine gallons; and on the other hand I may state, that I have seen a horse-power produced from five and six gallons. It does not signify much at what pressure the steam is. This is a point unsettled at present by engineers; some advocate high, others low pressure. If he wished to increase the power of his engine, he would increase the weight of it, and decrease the size of the wheels; the union of the two is not necessary as far as regards the intensity of power; the quantity of power must be produced by an increase of weight, or by some increased or rapid formation of steam. It is well known that one engine, when worked at a given rate, works expensively; that an engine working at a quicker rate, if a piston only travel half a mile an hour, or 50 feet a minute, it will require more fuel for it to do a given work, than if working at 200 feet a minute.

The advantage gained by certain rapidity of action, arises from the inequalities of the road being overbalanced by the momentum of the carriage; when the carriage travels slowly, every inequality, every stone or slight obstacle partly destroys the momentum, but at a certain speed it overcomes them.

There is no actual gain of quantity of power by momentum; in a carriage on a common road, it acts on inequalities as a fly-wheel does, in overcoming unequal obstacles in machinery.

Mr. Gurney considered that one bushel of coals is equal in raising steam to two bushels of coke. The difference of price is

about two-thirds. Coals would be much cheaper than coke, but that loss in the expense of fuel we are disposed to suffer rather than produce a nuisance on the road by smoke. He did not think it possible to make such a combustion of coals as would consume all the sublimated or volatilized matter; the consuming of smoke, or the combustion of smoke is prevented principally by the particles being mechanically mixed with or surrounded by carbonic acid gas. It was not chemically combined.

If the consumption of smoke depended on the presence of oxygen gas or atmospheric air which contains it, the motion of the carriage and the current of air that is produced by going quickly through the air, would have a great effect as a smoke-consuming apparatus. But, on his previous reasoning, he did not think the consumption of smoke would be effected by any quantity of atmospheric air. He had made several very extensive experiments on this subject, and the only experiment that succeeded was by passing it through sand mixed with quick lime, by which the carbonic acid was absorbed, and the smoke, as it passed through the mixture, rendered combustible; the carbonic acid was removed to a considerable extent, and left the carbonic oxyde and hydrogen gas in such a free state as to be combustible.

The materials of his wheels were the same as a common stage coach wheel. The diameter of the wheels of the drawing carriage is about five feet, and the ordinary diameter of a stage coach that is drawn is about four feet six.

Mr. Gurney had taken the loss of iron upon coaches after knowing the number of miles they had travelled over, and the loss of iron on the steam carriage, and the number of miles it had travelled over, and he found that the loss in both cases bore the same proportion.

On the Manchester and Liverpool railroad there is a clause in their Act to prevent any nuisance being made by smoke, and coke is therefore used; but, in the ordinary railroads in Wales and other places, coal is used.

My safety valve is generally situated in the steam pipe leading from the boiler to the carriage; so that the steam, as it passes through that pipe, may lift the safety valve, or it may go to the engine, as the state of pressure shall determine. I occasionally use two, but we now use only one safety valve.

Mr. Gurney believed that the bursting of boilers is not always occasioned by pressure of steam. He had discovered that at a certain degree of temperature, and under certain circumstances, when water is decomposed, that the hydrogen is often formed into a new state of combination with oxygen and nitrogen gas, which compound is exceedingly explosive; so much so, that he believed scarcely any provision that we can make in the shape of a safety valve would protect the vessel. This was a subject which he was led to some time ago, from some observations he had made on the combinations of oxygen and hydrogen only. Gay Lussac was,

Mr. Gurney said, of the same opinion, particularly that there were different chemical compounds of hydrogen and oxygen gases which at present were not acknowledged. The only one acknowledged in this country is that forming water. A compound of two proportions in volume of oxygen and two of hydrogen had been chemically combined in Paris, although we never have succeeded publicly in this country. This compound was highly explosive when brought in contact with certain substances. He had reason to believe, from some original experiments, that there is a compound of these elements produced under certain circumstances in steam boilers. The want of water in a boiler is favourable, in which case the temperature is raised, and the compound formed; the bursting of boilers he considered frequently took place, from this compound coming in contact with substances that will decompose it; and it is a very interesting fact, that boilers often burst when the valves are known to blow at a pressure very considerably lower than the boiler has been proved to. When water is high in them they never burst; but when it is so low in them as to form this chemical compound, they do.

A fact was mentioned to him by Sir Anthony Carlisle, which throws considerable light upon the subject, and first led him to experiments respecting it. The case was, that a boiler at Mr. Meux's brewery, with an open top—a common cauldron—burst with a violent explosion, by which one man was killed and two very severely scalded. There was no cover at all on the vessel. This phenomenon, upon inquiry, appeared to be occasioned by gelatinous matter, forming a crust, a film, or blister, and prevented the contact of water with the bottom of the boiler; the bottom of the boiler, consequently, got hot; the compound alluded to was formed, or the rupture of this film, and the sudden contact of water against the hot surface below, produced such an immense and sudden volume of steam, that it burst the boiler. This Mr. Gurney considered as analagous to the bursting of a gun, in which case an ounce or two of shot is placed only against the charge; whenever there is a sudden formation of elastic matter, and there be ever so small a weight opposed, the shock will be very great, and a gun will frequently burst, though there is not an ounce of shot in it, and which charge may be considered in the light of a safety valve in this case.

The explosive compound alluded to never forms without a certain raised temperature. Before this temperature, necessary for decomposition, takes place, it melts a fuseable compound alloy of metal, placed so as to allow of its escape; the matter formed escapes, and all danger is prevented. The melting of the safety plug only takes place in cases of great negligence, or in cases of extremity. The gauge by which the quantity of water in the boiler is ascertained, is the common glass gauge, well known to those acquainted with the subject.

To ascertain the intensity of the steam, a piston, which is

forced out in proportion to the pressure, is used; in addition to the glass gauges there are also stop cocks, so as to ascertain, by turning them, the actual height of water.

A carriage was originally supposed to draw only three times its own weight on a rail-road; but in some experiments which he made in Wales with Mr. Crawshay, of Cwrfaithfa Castle, they found, in an experiment, that a carriage drew thirty times its own weight; but in practice they scarcely exceed five times, or from five to ten. On the common road, however, only weight for weight. It was possible to do more; but circumstances vary so much on the common road, that we ought not to calculate on doing more than weight for weight.

His impression was, that for locomotion, rail-roads are unnecessary; that locomotive engines on roads will supersede them on rail-roads, and under this impression he had uniformly declined having any thing to do with rail-roads.

Mr. Gurney anticipated that passengers would be carried at one-half the rate by his steam carriages that they are by the common carriages, and, if they had a paved road for this purpose, it would reduce the expense to one-half again.

In propelling on ice, a very little roughing of the wheels is necessary, in the same manner as you rough the shoes of horses, and little power being then sufficient to propel the carriage, the full force of the engine is not necessary to be exerted: in deep snow there certainly was great difficulty; but, as the subject goes on improving, those difficulties will be overcome. The velocity of travelling is limited by practical experience only; theoretically it is limited only by quantity of steam; 12 miles might be kept up steadily, and run with great safety. The extreme rate that they had run was between 20 and 30 miles an hour. The carriage, when upset by Sir Charles Dance, was at that time going at 18 miles an hour, but no injury happened either to the machinery or the persons upon it; and that speed might be maintained with perfect safety by a little experience in management.

The great national advantage arising from Mr. Watt's improvement Mr. Gurney considered, was, his application of the steam engine to machinery; and the extent of that advantage to the community had been in a direct proportion to the removal of horse power, a most unproductive labourer and a dead expense to the country. If this view of the subject be entertained, the application of steam to propelling carriages on common roads would be as important above its application to machinery generally as the number of horses employed in locomotion exceed those necessary to machinery, which bears no proportion with respect to each other. At Hounslow alone, there are at this moment upwards of 1000 horses employed in stage coaches and posting. On the Paddington road, a distance of five miles only, there are upwards of 1000 horses employed at this moment. Throughout Great Britain it is almost impossible to say how many horses are employed in

posting and stage coaches. If it is possible to remove those horses by an elementary power, which he firmly believed was practicable, the national advantage would be in proportion to the number of horses so removed; for if it is shown that one carriage horse can be removed from the road by the present state of steam carriages, there is no reason why every horse so employed should not be so removed. It has been decided that the consumption of a horse is equal to that necessary for eight individuals, so for every horse that is removed and is supplied by elementary power, we make way for the maintenance of eight individuals. If it is possible to do the principal work of horses by steam, or if it can be done by elementary power, the Committee might imagine to what extent we might provide for our increasing population. He believed that the introduction of steam carriages will do more than any other thing for this country; had always had that impression; left an honourable and lucrative profession, in which he was extensively engaged, in order to attend to this subject, being convinced of its importance and practicability. Imperfections will exist in the machinery; but he conceived that the main points of difficulty had been removed by the experiments he had made *.

Mr. Gurney anticipated that steam would be supplanted by the use of other elementary power; but did not think that would take place in our day. He thought that steam would be generally introduced, and that afterwards scientific men would be directed to examine and employ in its stead other substances, which are known to produce power by chemical change; some peculiarly explosive and aeriform bodies for instance. He was informed that at present there are between 20 and 40 different carriages building, or about to be built, by different persons, all of which had been occasioned principally by the decided journey which he took of 200 miles in 1829, and which convinced not only the public of its practicability, but also some of those very men who are now employed in this object, and who previously had laughed at the idea, and considered it chimerical †.

As we have no room for extending this subject in the present number, we shall conclude by noticing one more remark of this witness—it requires no comment.

Upon the Liverpool rail-road they first applied the power to the outside of the wheel, but they *have come to my* drawing (No. 3.) *at last*, and they *now* work by the crank on the axle!!!

* We should be glad to learn what "points of difficulty" Mr. Gurney has overcome, or what mechanical contrivance he has invented, which his predecessors and contemporaries have not done quite as well? Mr. Walter Hancock has, with plans more original and single-handed, far surpassed Mr. Gurney, and at a thirtieth part of the expenditure.

† How could "*all*" have been occasioned by Mr. Gurney, when several of the locomotionists now engaged took out their patent prior to Mr. Gurney. Mr. Gurney should not be allowed to engross all the merit to himself, because he has had most money to spend and make a show with.

AMERICAN PATENTS.

Specification of a Patent for a new Mode of combining the power of the Lever and the Pulley, in the Standing Press. Granted to GEORGE W. GRATER, *of Boston, Massachusetts, October* 1, 1830. *and assigned by him to* LEMUEL BLAKE, *of the same place.*

To all whom it may concern, be it known, that I, George W. Grater, of Boston, in the state of Massachusetts, have invented a new mode of combining the powers of the lever and the pulley, in the standing press, for pressing articles of various kinds; which press is intended to be used as a substitute for the ordinary lever, screw, and hydrostatic presses; and that the following is a full and exact description of the same.

I make a strong frame, which may consist of cheeks, properly united by cross pieces, with mortises and bolts, in the manner common in screw presses; or, instead of cheeks, I use four strong corner posts, mortised into sills, and having such cap and cross pieces, or ties, framed into them, as may be deemed necessary. This latter mode I prefer, and it is the one which is represented in the drawing deposited in the patent office. The bed of the press I usually place near the upper part of the frame, or cheeks, bolting and otherwise, securing it firmly thereto; the follower being suspended below, by the tackle, in the manner to be presently described.

Across the top of the frame, or cheeks, and extending from side to side, I affix a strong iron axle, turning upon gudgeons, in suitable boxes; upon this axle, and usually near its middle, I place an iron toothed wheel, and on each side of this wheel, cylindrical pieces of wood, or other material, around which the rope to be used is to wind in the operation of the press. A second axle is placed parallel to the former, having upon it a pinion or small toothed wheel, which takes into the former; there is also fixed upon this axle, a round block, or hub, with mortise holes, to receive the end of the lever, or hand spike, which is to operate upon this compound windlass. Ratchetts and palls are employed in the usual manner. At each end of the bed, and of the follower, and attached thereto, I place two, three, or more sheeves, or pulleys; the ends being notched out to receive them, and a bolt upon which they are to turn, passing through, or on one side of the bed and follower. For the purpose of obtaining the greatest strength, it will be best to secure these bolts, by staples, on the upper side of the bed, and on the lower side of the follower, instead of passing them through their substance.

The press, as before described, is now ready for the reeving of the rope, which is thus effected. A single rope is taken and passed under the follower towards the back part thereof, the two ends being brought up through openings left in the ends of the follower for that purpose; they are then passed over the two back pulleys of the bed, and under the two of the follower, and successively around the re-

maining pulleys, until they pass up from the last pulley on the front of the follower; the two ends are now secured, one on each of the cylindrical pieces of the first named axis, when the press is ready for use. In order to preserve an equal tension in the rope, that part of it which passes under the bed is sustained by friction rollers.

The operation of the press is now manifest, as it is similar in principle to that of an ordinary tackle, operated upon by a windlass.

In order to sustain any part of the articles in press, at any required height, holes are bored through the cheeks, or uprights, into which rods, or pins, may be inserted, so that any part may be taken out and renewed without taking out the whole.

If it be thought best to have the bed below, and the follower above, this may be effected by reversing the whole arrangement; but in this case the weight of the follower and of its appendages, must be counterpoised, by extending a rope from each end of it, passing over a pulley above, and so loaded as to sustain it in its place.

Presses operated on by means of a windlass and tackle, have been heretofore made, but they have been inconvenient in use, in consequence of the arrangement of the parts. I do not, therefore, claim a lever and tackle press, generally, but what I claim as constituting my invention, is the manner in which the rope is reeved over the pulleys attached to the bed and follower, as described in the foregoing specification.

It will be obvious that where continued pressure is required, a weight may be allowed to remain suspended upon the end of the lever, which added to the elasticity of the ropes, will produce a powerful continued effect. It may likewise be observed that chains may, in certain cases, be substituted for the rope.

GEORGE W. GRATER.

Specification of a Patent for a Machine for flattening cylinder window Glass. Granted to WILLIAM COFFAN, Jr. *Hammonton, Gloucester County, New Jersey, October* 1.

BE it known, that I, William Coffan, jr. have invented a new and useful improvement in the machine for flattening cylinder window-glass, and that the following is a full and exact description of the construction and operation of the said machine as invented by me. The present mode of flattening glass, is, by having two stationary stones, one in the flattening oven, on which the glass is flattened out from the cylinder form, and then is passed, by sliding over the surface of this stone, on the other stationary stone, which is in the annealing, or cooling oven, through a small crevice under the partition wall which separates the two ovens, about half an inch above the surface of the two stones, which are joined together underneath this partition wall, and then the glass is raised up from the stone in the cooling oven, after sufficiently cooled, and stacked away.

What I claim as new, and as my own invention or discovery, is.

an improvement made in the above described machinery, and for the use of which I ask an exclusive privilege. This consists in having a circular table, or wheel, with the stones for flattening and cooling placed upon both sides, on the top, or to cover the whole surface: and to carry the glass upon it when flattened, by revolving horizontally upon its centre, to the cooling, or annealing oven; to be supported and worked by proper machinery for that purpose, instead of having the two stones permanently fixed, one in each oven, and the glass shoved or pushed over the surface of the stones from the one in the flattening oven, to the other in the cooling oven.

The centre of this horizontal wheel or table, is to be under the partition wall which divides the two ovens, at a distance above the top of the wheel, or table, sufficient to pass the glass under, so that the glass placed upon, and flattened on the stone, on the half of the wheel, or table, in the flattening oven, may be carried round upon this table which revolves on its centre, under the said wall, to the cooling oven, without taking it from the stone until it arrives in the cooling oven, and then, when sufficiently cool, to be placed away; at the time the wheel, or table, is stopped revolving, and the glass upon it is cooling and taken off in the cooling oven, after having been conveyed upon it, from the flattening oven, another cylinder can be flattened on the stone on the other half of the wheel, or table, that has passed by its revolution from the cooling to the flattening oven.

By this operation it does not require that the glass should be removed from the stone upon which it is flattened, which preserves the polish, and prevents the surface of the glass from being scratched, which is the case when it is pushed over the surface of the stones, from the one to the other. It also differs from the other mode, in this, that by the revolving of this wheel, or table, the stones are both made flattening, and both cooling stones, or the whole wheel, or table, is both a flattening and cooling stone.

William Coffan, Jr.

Specification of a Patent for a Rail-road Car. Granted to John Elgar, *of Baltimore, Maryland, October* 1, 1830.

To obtain a form and combination of substances that will reduce the friction in the rubbing parts of a rail-way car, to its lowest point where the "friction wheels" are not used, I adopt the admirable plan of outside journals, introduced and patented by R. Winans. The essential advantage of which is, that the journals are reduced one-third in diameter (of course the friction is equally reduced) still preserving the full size and strength of the axles between the wheels. The axles extend through the wheels, about 4½ inches, are steeled, and turned to 2 inches diameter, and hardened, which forms the journal. To this journal I adapt a bearing, or box of cast-iron, either in two pieces, or one entire piece; and to obtain an opening in the box that shall at once combine a proper shape to fit the jour-

nal, with a smooth and excessively hard surface, it is cast upon a "chill," or piece of iron dressed to the size of the journal, but with three ribs upon it, running lengthwise, which divides the circular opening of the box into three parts, and reduces the bearing on the journal to one-fourth of its circumference. In the contact of substances so hard, this quantity of surface is sufficient, and the friction is less.

The back part of the box is at the same time *chilled*, for the purpose of receiving against it the steel centre point of the journal, that the tendency to lateral motion may be governed, without the friction consequent upon shoulders. To exclude dust, and confine the oil, I use a packing plate, similar to that which is used at the piston stem of the steam engine. This plate passes on the journal in front of the box, and is screwed up to the latter, with packing of hemp, leather, or cork.

The side, or face of the plate toward the wheel, has a projecting flanch upon it, which embraces the hub and excludes the dirt.

The box will perhaps contain one half gill of oil beside the journal, which insures a perfect lubrication of the latter.

The improvement that I claim as my invention, is the chilled, cast-iron box, combined with the *steeled*, centre pointed journal; the peculiar form of the inside of the box, which reduces the surface of the bearing, and the packing plate.

JOHN ELGAR.

Specification of a Patent for an Improvement in the construction and application of Friction Rollers. Granted to DAVID BALDWIN, *of Queensbury, in the county of Warren, and state of New York, October* 1, 1830.

THE friction rollers which have hitherto been applied to the gudgeons of heavy wheels, or to the axles of carriages, have generally been constructed as follows. A number of cylindrical rollers of cast iron or brass, are connected to a flat ring at each end, by an arbour passing through each roller being rivetted to these rings. The rollers are then fitted to a hollow cylindrical metallic box, the inside of which is smoothly finished, so that the rollers may roll freely around its internal surface: a cap is then fitted to each end to keep the rollers in their place; perforations being left sufficiently large to permit the rings to which the rollers are rivetted to revolve freely within them. This box of rollers is then put upon the axle, or gudgeon for which it is intended. The objection to using rollers thus constructed, is, that it is difficult to tighten them when worn; which will soon happen if used in heavy work. To obviate this difficulty is one of the principal objects of the present improvement.

My improved rollers are constructed in the following manner. The middle portion of each roller is cylindrical, but the two ends are in the form of the lower fructrum of a cone, with the bases ap-

plied to the cylindrical portion, and of the same diameter. The rollers are connected to each other by a ring at each end in the common method. The box in which they run is shaped on the inside to correspond with the shape of the rollers. The straight, or cylindrical part of them, however, is not permitted to touch the inside surface of the box, a slight enlargement being made therein for that purpose. The rollers then touch the box only on the slant side of their conical ends, and it will readily be perceived that if they wear, they can be tightened, if the upper and lower parts of the box can be brought nearer together, and that this may be done, I construct the box in the following manner. In the first place, let the box be made a perfect hollow cylinder, as in the old method, a little larger than is necessary to receive the rollers which must be placed within it. There will then be a space between the tapering ends of the rollers and the inside of the box, which must be filled up. Let a casting be made to fill this cavity, and fitted so that it may be put in and taken out at pleasure; and from around the upward portion of this casting, let a circular flanch project outwards, so that its outward edge may correspond with the outside of the cylinder, and its bottom may be brought in contact with the cylinder's upper surface. (The terms upper and lower are here employed with reference to the position of the box when used for a grist mill spindle, or any other perpendicular shaft.) Let two screws pass through this flanch into the cylindrical box, which is tapped for their reception opposite each other; that is, one screw on each end of a diameter of the cylinder. Let another diameter be drawn at right angles with the first, and at each end place another screw, the female part of which is within the flanch, and its blunt end pressing upon the edge of the box. The first mentioned screws will draw the two nearer together, and the others will separate them, so that by these screws they may be made lose, or tight, at pleasure. Connected with this flanch, and in the same place, another flanch projects inwards as far as may be, without interfering with the rings to which the rollers are fastened, the object of which is merely to keep the rollers steady. Both ends of the box may be fitted in the manner above described; or the lower portion of the box may be made to fit the taper of the rollers. A flat ring screwed to the bottom as above described, with an elevation from its lower surface for the rollers to rest upon, will serve to raise or lower them, as may be required. The rollers and boxes may be made of any metal sufficiently hard, whether cast or wrought, but for heavy work, I prefer cast-iron.

Another improvement which I believe to be new and useful, is the application of friction rollers to the spindles of grist mills. It is well known that it is somewhat difficult to bush a spindle properly. If made too loose, it will not run steadily; if too tight, it will soon heat. My method of applying the rollers to the spindle, is simply to fit them accurately to it, and to wedge the box which contains them, into the eye of the lower stone. The grain is kept from falling into the box by a leather collar fitted to the spindle, as has been formerly practiced.

What I claim is the making of a portion of each end of the rollers tapering, that they may be tightened, as above described; and the application of friction rollers to the spindles of grist mills.

DAVID BALDWIN.

A sectional drawing accompanies the specification, which we have copied at fig. 3, Pl. XIV; to be intelligible to the reader, it must be considered as representing only a *front* outline. The following explanation is given in reference to it.

A, A, section of the hollow cylindrical box to receive the rollers.

B, B, a short cylinder, the outside of which will fit the inside of the box A, and the inside just receive the tapering ends of the rollers.

C, C, the bottom of the box A, A, attached by screws in the same manner with the upper portions B, B.

D, D, sections of two of the rollers, the gudgeons of which are rivetted to the rings at E, E, E, E.

F, a spindle within the rollers.

LIST OF NEW PATENTS SEALED.

BOILERS.—To J. Perkins, of Fleet Street, London, engineer, for improvements on his former patent, dated July 2, 1831; making the same applicable to the evaporating and boiling of fluids for certain purposes.—Dated August 27, 1831.—Specification to be enrolled in six months.

BUTTONS.—To B. Aingworth, of Birmingham, button-maker, for an improvement in the working and constructing of buttons.—August 30, 1831.

PAPER.—To J. J. Jaquier, of Castle Street, Leicester Square, for improvements in machinery for making paper, which he denominates "Xeranothlipte." Communicated to him by a foreigner.—August 31, 1831.—Six months.

EXCAVATIONS.—To H. G. Dyar, of Panton Square, Middlesex, for an improvement in tunneling.—September 5, 1831.—Six months.

WHEELS.—To G. Forrester, of Vauxhall Foundry, Liverpool, civil engineer, for improvements in wheels.—September 5, 1831.—Six months.

IGNITION.—To W. Bickford, of Tucking-mill, Cornwall, leather-seller, for an instrument for igniting gunpowder when used for blasting rocks, &c.—September 6, 1831.—Six months.

WATER.—To J. Neville, of Great Dover Street, Surrey, engineer, for for an improved apparatus for clarifying water and other fluids.—September 9, 1831.—Six months.

STEAM ENGINE.—To G. H. Palmer, of Manchester Street, Gray's Inn Road, civil engineer, for improvements in the steam engine and boiler, and apparatus connected therewith.—September 16, 1831.—Six months.

IMPRESSION.—To J. Potts, R. Oliver, and W. W. Potts, all of New Mills, in the county of Derby, engravers to calico-printers, and co-partners, for an improved method or process of obtaining impressions from engravings in various colours, and applying the same to earthenware, &c.—September 17, 1831.—Six months.

WRITING.—To S. Mordan, of Castle Street East, Finsbury, engineer, and W. Brockedon, of Devonshire Street, Queen Square, esq. for improvements in writing pens and pen holders, and in the method of using them.—September 20, 1831.—Two months.

WATER.—To M. Cosnahan, of the Isle of Man, esq. for improvements in apparatus for converting sea or salt water, and other impure waters, into purified or fresh water.—September 20, 1831.—Six months.

PATENTS ENROLLED BETWEEN 10TH SEPTEMBER, AND 10TH OCTOBER, 1831.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

RUDDERS.—To William Peeke, of Torquay, Shipwright, and T. Hammick, of the same place, Ship-smith, a patent for "improvements in rudder-hangings, and rudders for ships and vessels," was granted on the 21st of March, and the specification was enrolled in the Rolls Chapel Office on the 21st of September, 1831.

The loss of a ship's rudder at sea, or even the disjointing of it, is often a very serious affair;—nevertheless the usual mode of hanging a rudder to the stern post, (which, we dare to say, has prevailed a century or two) is most felicitously calculated to allow of the rudder being lost!—it is merely hung by eyes upon hooks, there being no mechanical obstacle worthy of consideration to prevent the first wave or grounding of the vessel to lift it off its hooks and dispense with its services. It is but recently, we believe, that the correction of this unskilful device, has occupied the attention of mechanics, and we know of none which has a better claim to notice than the plan before us; which we are happy to see emanates from men who must necessarily have a practical acquaintance with the subject.

The stern-post is hollowed out into a deep circular groove throughout its length on that side to which the rudder is attached; on this groove is fixed, longitudinally, a thick metallic plate, having a series of long slot mortices made through it, opening at their upper ends into square holes, of greater breadth than the slots. Thus is formed what is usually denominated a locking-plate, into which the studs of the dove-tailed hinge pieces, delineated in plan and elevation, at figs. 1 and 2, Pl. XV. are inserted, at the square holes, and are slided down the long slots, which leaves the stern-post with these pieces (seven or eight in number) projecting horizontally from it.

The rudder is prepared first by rounding its inner edge, corresponding with the circular groove in the stern-post, so that when put together they form what is termed a close rule-joint. To receive the hinge pieces and to adapt the hinges to the rudder, the inner or rounded edge of the latter is cut away at the proper places, just sufficient for that purpose and no more, and the hinges

(of which a plan and side view is given at figs. 3 and 4.) are affixed to the upper end of the cavities, the straps of which are bolted to the rudder, in the usual manner. As there would be a waste of metal if the rounded eye end of the hinges were made of the same dimensions as the section of the rounded edge of the rudder, they are made smaller, and the vacancy made good by dead-wood pieces, nearly of the form of a horse-shoe, (represented at fig. 5.)

Note.—In small vessels, the quantity of metal required would not be so great in proportion, in which case these parts of the hinges might be made of the same area as the rudder where they are fixed, and they would thus obviate the necessity of having dead-wood to fill up with.

In fitting the rudder to the stern-post, it is first secured thereto, by a long bolt passing vertically through two pair of eyes in the upper part of them, and the lower series of hinge joints, which we have previously described at length, are fastened by short bolts or pins; these are put through square cavities (as explained by the diagram, fig. 6.) and dropped into the eyes of each pair of joints; the holes being afterwards plugged up by square blocks made to fit them. We have added another, fig. 7. which will, we trust, fully explain the arrangement of parts, as seen in *plan*; *a* being the stern-post; *b* the rudder; *c c c* the strapped hinge bolted thereto, and placed over the hinge piece of the stern-post, the locking stud only of which is brought into view at *d*, which is shewn inserted in the slot of the locking plate *e e*; *f* shews one of the centre pins.

By this mode of hanging a rudder, it will be evident, that when the rudder comes in contact with a sand-bank or rock and is lifted, no disconnection can take place, as the hinge pieces will slide up with it, as they are always fastened together, and to prevent their passing out of their holes when rising, the holes and slots are made at unequal distances apart, which renders that occurrence impossible; the stern-post must therefore be torn away from the ship before the rudder can be lost.

Boiler Furnaces.—To J. Slater, of Salford, Bleacher, for "improvements in the method of generating steam, applicable as a moving power, &c." a patent was granted on the 2nd of April, 1831, and the specification was enrolled in the Rolls Chapel Office on the 2nd of October, 1831.

The specification of this patent, especially the introductory

part, is rendered so obscure by a vast multiplicity of words, in which the same idea is expressed in such a variety of shapes and ways, that we were forcibly reminded of the directions in a country dance,* although the latter must be the least bewildering of the two, even to the most staid and sober-minded philosopher. For our own parts we must confess, that our patience would hardly carry us through the verbose document, and what we did collect from it we will shortly explain.

To save the waste heat which accompanies the smoke, and usually escapes up the chimney of a steam engine furnace, Mr. Slater causes the smoke and heated gases from the fire to be divided by a series of parallel channels, into a number of minute streams. These channels, which we will term smoke-channels, are formed of thin plate iron, and have uniform spaces between them, so as to produce a similar number of channels for the introduction and passage of cold air, which is caused to pass in an opposite direction to that of the smoke, in order to rob the latter of its heat. The atmospheric air thus heated, is collected into a reservoir, and applied in regulated quantities to the furnace to support combustion; the greater portion being directed through the fire-bars, and the lesser portion forced over the fire bridge, to render the smoke issuing from the furnace inflammable, and cause it to be consumed. The mechanical arrangements adopted by the patentee are exhibited in two sets of drawings, representing two different modifications of the apparatus; (in one of which the fire bars are hollow) but we have not thought it necessary to give them in our work, as we did not discover any peculiar traits of originality that demanded it. Our readers will of course see the necessity of mechanical force being applied to produce the two counter currents we have described, of which the patentee has properly availed himself, by the use of rotatory fanners for that purpose. He thus exhausts the smoke passages by one, and impels the air through the air passages by another; or, as he observes, there may be an exhausting apparatus at one end and a forcing apparatus at the other end, of each of the sets of channels: and further, that a stream of steam may be directed vertically up the chimney to increase the draught. There is of course nothing whatever new in all that we have mentioned, which the patentee seems to be aware of, by apparently confining his claim to this mode of generating steam "*when applied as a moving power!*"

* "Cross hands and back again, down the middle and up again, cast off and figure in, &c."

This is the mouse for which the mountain has laboured, and has been brought forth by Dr. Farey, upon three immense skins of parchment.

PAPER MAKING.—To George William Turner, of the Parish of St. Mary Magdalen, Bermondsey, in the county of Surrey, Paper Maker, a patent for "certain improvements in machinery or apparatus for making paper," was granted on the 21st of March, 1831, and the specification was enrolled in the Rolls Chapel Office on the 21st of September, 1831.

The "machinery or apparatus" mentioned in the above title, consists, in the invention of a new species of sieves, for the purpose of separating and retaining the lumps and coarser parts of the pulp from the finer portion, which passes through the interstices of the sieves, and thence flows upon the endless web, or into moulds for the subsequent operations of the paper-maker, and, in the mode of applying them, so as to supersede the use of, and form an improved substitute for, the *vat* and the *hog*.

Mr. Turner describes several forms of seives in his specification, slightly varied, but partaking of the same characteristic features. That to which he appears to give a preference is of a circular form, and consists of a series of concentric rings of thin metal, bent into the form of the letter L but reversed (⅂); these are each about half an inch wide, and are placed in concentric circles, so nearly together as to leave a crevice between them of one fiftieth or at most one fortieth of an inch wide, in order that only the finest portion of the pulp shall pass through: they are fixed by means of small screws (or by solder, &c.) to radial arms, projecting from a central block to a peripheral band, which is about eight inches deep, and the diameter of whose circle is about three feet. We have given a diagram representing this part of the apparatus in section, at fig. 11, Pl. XV: at *a* is a vertical spindle, fixed into a block *b*; at *c c*, *d* are brought into view three of the radial arms, *d* being in section; *e e* are the concentric rings, and *f f* the hoop or band.

The manner in which these sieves are used we will explain, with reference to the diagram, fig. 12, Pl. XV: *a* is a strong metallic standard or frame; *b b* a vibrating beam, whose centre of motion is at *c*; the vibrating action being produced by a revolving crank *d* and connecting rod *e*. The spindles *f f* of the sieves are attached to the vibrating beam *h h*, and passing through guide holes in the arms of the frame *a* they are made to

revolve, by a band operating upon the drum *i*, and an endless strap embracing the two pullies *j j* fixed to the vertical spindles of the sieves.

Thus two motions are communicated to the seives, the up and down, and the rotary; the upward motion producing a partial and temporary vacuum underneath, which causes the air above to press the pulp through the concentric interstices more readily, and the downward motion causing the fluid underneath to dislodge the grosser parts of the pulp that may have stuck and clogged up the same; this vibratory motion also tends to disturb and agitate the fluid pulp, which would otherwise by the rotary motion get into a uniform eddy unfavourable to the operation required. The pulp that passes through the sieves flows over a wide lip, directly on to the endless wire web or moulds, and thus supersedes the use of the "hog."

STRETCHING MACHINE.—To Samuel Morand, of Manchester, a patent for "an improved stretching machine," was granted on the 14th of April, and the specification was deposited in the Rolls Chapel Office, on the 10th of October, 1831.

The object of this machine is, the stretching of cloth, including every kind of woven fabric that may have shrunk in the processes of dyeing, bleaching, &c., to their original or desired dimensions.

The machine consists of a long horizontal rectangular frame of iron, upon vertical supports and cross bars. At one extremity of the top of this frame is an horizontal axis, by which motion is given to the whole apparatus, through the medium of a winch handle: two chain wheels are mounted upon this axis, so as to have a sliding motion upon it longitudinally, but so as not to turn round: near to the opposite extreme end is a corresponding pair of chain wheels, which run freely upon their axis: two endless chains passes round these two pair of wheels, having sharp pins projecting therefrom on the outside, and in their progress from one end of the machine to the other, the chains pass through "chain-races," which are long metallic troughs, of sufficient capacity for the free passage of the chains through them, as shewn *in a section* of one of them, at fig. 8, Pl. XV. at *a a b*, which is made in two pieces and fastened together at *b*: the parallelogram at *c* represents a section of an endless chain, (which passes along the race) and having one of the sharp projecting pins *d* screwed into it, with a nut at *e*. In the adjoining fig. 9, (Pl. XV.)

is given a plan of three links of the chains, which shews their form and that of the indentations on the peripheries of the wheels, into which they imbed themselves as the wheels turn round. The dark spots at uniform distances on the links represent the holes into which the sharp projecting pins are screwed. The links of the chain are connected somewhat loosely, to admit of a little lateral play; and the two chain-races through which they pass, though inflexible, are each divided into two parts about midway, where they are connected by a hinge joint, which allows the two opposite half lengths of the races to converge from the parallel into which they are first placed; but in which parallel the other two halves of the races always remain; these latter halves are supported by upright blocks which traverse in slot mortices, made in horizontal bars that are fixed across and form part of the framing of the machine; and this portion of the races are, by means of the slots, made to approach or recede parallely to or from each other, according to the desired width of the cloth to be stretched, and when adjusted to the dimensions the supporting blocks are fixed in their proper places by the turning of a screw. At the end of this parallel portion of the races, but midway of their whole length, are the hinge joints before mentioned, which allow of the remaining portion of the races to converge towards each other, and at the farthest extremity of these races are fixed projecting brackets, which carry the axis of the second pair of chain wheels before mentioned, and to each of these chain wheels is fixed a spur wheel, which takes into pinions above, on whose axes are fixed small drums, with projecting points, called pricking pulleys, which thus revolve over the chain wheels, and the points that project from each pass between another. The cloth to be stretched is first brought over a weighted card roller, and the edges placed upon the pins in the chain, (which passes over the chain wheels free of the races) and is further secured by being pressed in the opposite direction by the pricking pulleys, when the winch is turned; which drawing round the endless chain, the latter carries the cloth stuck upon its points, and the chain gradually diverging in its progress, stretches the cloth by uniform degrees, till it passes the midway hinge joints, where the races become parallel, and the cloth is stretched to its proper and regular width. That portion of the races which had been made to converge to the reduced width or the unstretched cloth is brought into the parallel or full breadth by means of a right and left-threaded screw, to which motion is given by the machine, through the medium of

some small mitre wheels; the operation is thus—the axis of the screw being turned in one direction, and the left-handed screw passing through a nut in a supporting block of the chain rail, which slides in a horizontal slot mortice, and the right-handed screw passing through a similar support to the other chain race, the races are made to recede or diverge from each other. (A diagram explanatory of this movement is given at fig. 10.) The cloth is stretched in a damp state, and allowed to remain a sufficient time for the fibres to fix themselves in their changed positions.

GLASS ORNAMENTING.—To Apsley Pellatt, of Falcon Glass Works, Holland Street, Blackfriars' Road, in the county of Surrey, Glass Manufacturer, a patent for "An improved mode of forming glass vessels and utensils with ornamental figured patterns impressed thereon;" was granted on the 9th of March, and the specification was deposited in the Petty Bag Office on the 9th of September, 1831.

This invention, which is said to have been partly communicated by a foreigner, consists in a process of stamping the ornamental figures upon the glass vessels or utensils while in a plastic state. For this purpose a cake or plate is prepared of equal parts, by weight, of plaster of Paris, and finely powdered brick dust, plaster of Paris and powdered rotten stone, or plaster of Paris and powdered calcined flint, which are to be carefully sifted, moistened, and mixed together. The brick dust, rotten stone, or calcined flint, are to be selected according to the fineness of the intended impression, using the latter for the finest work.

This cake is made to fit accurately into a dove-tailed receptacle in the interior of the metallic mould into which the glass vessel is to be blown, and the impression made by the application of a metallic die previously prepared with the intended impression by either engraving, casting, or modelling, according to the nature of the proposed ornament. The cake is to be made red hot, and put into its recess in the interior of the mould when it is to be used. The glass vessel to be ornamented is to be in the mean time prepared on the extremity of the blowing tube in the usual manner; it is to be introduced into the mould, and the blowing finished either by the mouth of the glass-blower; should that be insufficient, by a syringe, or air-tight bag connected with the blowing pipe, so as effectually to force the glass into the indentation on the red-hot mould plate. A portion of the powder of which the plate is composed, will stick to the glass sufficient in quantity

to prevent it from being injured by the subsequent heatings required for finishing the vessel or utensil, as well as the heat to which it is subjected in the process of annealing.

In the specification is also described an improved method of making the moulds for articles of glass requiring to be of a precise size and form. These moulds have been usually made with hinges that they may be readily folded back to allow of the glass vessel, or other article, to be taken out of the mould. Instead of this Mr. Pellatt proposes to make the different pieces of which the mould is composed to approach to, and recede from each other by means of screws, and to be guided to their places by dove-tailed grooves or rebates. By this means the different parts can be made to fit closer, and the glass vessel formed more perfectly.

The glass, after it has been formed and ornamented as we have described, is to be cut and polished in the usual manner, the ornamental impressions being cleaned from the dust of the pattern cake with which they are covered, appear exceedingly beautiful and sharp. Indeed the specimens which we have seen are not inferior to seal engraving; and as the cost of ornamenting glass according to this process cannot from the nature of it be great, the invention is one of considerable importance to the community, and cannot fail to prove advantageous to the ingenious patentee.

INKING APPARATUS.—To Richard Wood, of New York, in the United States of America, but now of Bishopsgate Without, in the city of London, a patent "for an inking apparatus, to be used with certain descriptions of printing presses," was granted on the 24th of May, 1831, and the specification was enrolled in the Enrolment Office, on the 24th September, 1831.

The inking apparatus designed by this patentee, does not materially differ in its construction from those in common use; but its application to common printing presses constitutes its claim for novelty. Here are an ink trough, a ductor roller, a feeding roller, a pair of distributing rollers and an inking roller, all mounted on a frame, with roller bearings so placed, that the feeding roller receives its ink from the ductor, and transfers it through the medium of the distributing rollers, which have an end as well as a rotatory motion, to the inking roller, which is made to pass forwards and backwards on the surface of the form, when it is brought from under the platten to receive a fresh

dose of ink and a fresh sheet of paper to be printed. The end motion is given to each of the distributing rollers by means of a right and left-handed screw, cut with their threads crossing each other on one end of its axis, which rests upon a single projecting tooth, which takes into the screw grooves on the axis, and answers the purpose of a nut. Then this projecting tooth has a stem turning in a socket, that it may be readily set to such an inclination as shall correspond either with the right or the left-handed screw. Now when the roller is moved the distance required in any one direction, the tooth comes in contact with an inclined projection on the roller, which reverse the inclination of the tooth, and through that means the end motion of the roller, while the rotary motion continues in the same direction, and this prevents the accumulation of the ink in ridges. This apparatus is so connected with the printing press, that it comes into operation as soon as the frisket and the printed sheet are removed from the form after every impression. The arrangement of the whole apparatus possesses considerable ingenuity, though there is little or nothing new in any of its parts taken separately.

DISTILLATION.—To Thomas Brunton, of Park Square, Regent's Park, in the county of Middlesex, Esq. a patent for "an improvement in certain apparatus, rendering the same applicable to distilling," was granted on the 28th of March, and the specification was enrolled in the Enrolment Office on the 28th of September, 1831.

The improvements here contemplated apply both to the mode of communicating heat to the wash and to the mode of condensing the vapour. It is proposed to make the fluid to be operated upon to pass with considerable rapidity through a series of copper vessels, placed immediately over the fire and surrounded by the flame, smoke, and heated air. The improved condensing apparatus consists of a series of convex lens-shaped vessels, which represent a large surface to the action of the condensing medium.

The principal parts of this invention are represented by figs. 1, 2, 3, and 4, Pl. XVI. In fig. 1, is *a a* a rectangular fire plate, forming one side of the vessel containing the wash under the process of evaporation; *b b b* a series of rectangular apertures in the same; to these are connected, by rivets, a similar number of heat-reservoirs, a side view of which, in section, is shewn by fig. 2, shewing a horizontal plate *c*, which divides each of the heat-reservoirs into two compartments, which communicate at the

farthest end; *d d* shows the grate bars of the fire, which plays around the heat receptacles. By this arrangement a circulating current will be produced in the fluid as it will enter the lower compartments, pass round the separating plate, and out above. Fig. 3 gives an edge view of the series of the lens-formed vessels, having apertures *e e e* opening one into the other at the centre, for the passage of the vapour, and a pipe *f f* at the bottom for the passage of the condensed liquid, which enters through small holes at the bottom of each vessel; a front elevation of one of these, with its central hole and connecting tube is afforded by fig. 4.

SHIPS' HEARTHS.—To John Wallace, of Leith, Brazier, a patent "for an improvement or improvements upon the safety-hearth, for the use of vessels," was granted on the 31st of March, and the specification was enrolled in the Enrolment Office on the 31st of March, 1831.

The improvements here contemplated are of two kinds, the first having reference to the preservation of the hearths in a vertical position, during the heeling or rolling of the ship, and the other to a means of directing the heat of the fire at pleasure, either to an oven or boiler for steam and hot water. The preservation of the vertical position of the apparatus is effected by making its base the segment of a circle whose radius corresponds with the distance of the position of the hearth from the centre of motion of the vessel, and making a corresponding curved railway for it to rest and roll upon. Both the base of the hearth and the curved railway are furnished with teeth, taking into each other to prevent the hearth from slipping from its place. The change of the direction of the heat is obtained by means of a flue passing between an iron oven and a boiler, the boiler being placed over the oven, with a horizontal partition dividing that part of the flue nearest to the fire into two equal parts. The end of this partition nearest the fire, has attached, a valve, which can at pleasure be turned up, to cause the flame heated air and smoke to pass along the upper surface of the oven, or down to cause them to pass along the under surface of the boiler.

The bottom of the oven consists of a perforated plate, with a sand receptacle below it; and in order to obtain a bottom heat to the oven, hot air is passed from the fire through this sand till its temperature is sufficiently elevated for the purpose required. In addition to these improvements in the baking, boiling, and

steaming parts of the apparatus, there are some peculiarities in the part applicable to roasting deserving of notice.

There is in front of the fire a roasting chamber of a rectangular form, with a meat spit passing horizontally through it. This spit is put in motion by means of a set of horizontal smoke jack vanes, placed in the smoke flue, which has an enlargement immediately over the apparatus for the reception of the vanes.

SPINNING.—To John Potter and James Potter, of Spiedly, near Manchester, Spinners and Manufacturers, a patent "for certain improvements in machinery, or apparatus, applicable to the spinning or twisting of cotton, flax, silk, wool, and other fibrous materials," was granted on the 21st of March, 1831, and the specification was enrolled in the Enrolment Office on the 21st of September, 1831.

The improvements described in the specification of this invention consist in arrangements by which the position of the bobbin and flyer are reversed with respect to each other. The bobbin is placed under the flyer, and motion is communicated to it by a pulley or whirl attached to the lower end of a tubular spindle upon which the bobbin fits. This is connected with a frame, and has motion communicated to it in the customary manner. The upper end of the bobbin spindle is made hollow, having a hole drilled down through its axis of rotation; for the reception of the spindle of the flyer, which is made to fit accurately that it may turn freely without shaking or vibrating. The method by which the patentees connect the various parts of their apparatus is minutely described in the specification, and exhibited in drawings attached thereto; and the mode of communicating the different motions clearly pointed out. But these matters we have not deemed it necessary to detail at length, as they may be varied to suit the tastes and convenience of different manufacturers, still retaining the principle of the invention above explained; evidently possess sufficient merit to render it useful to the public and advantageous to the patentees.

HARNESS.—To Thomas Coleman, of St. Alban's, in the county of Hertfordshire, Training Groom, a patent "for an improved roller for horses," was granted on the 29th of March, and the specification was enrolled in the Enrolment Office on the 28th of September, 1831.

The girths or bands by which horse cloths are kept in their

places, are technically denominated horse rollers; and to their application as usually made there is considerable objection, on the ground that they prevent the expansion and proper growth of the muscles of the young horse, when made sufficiently tight to keep the cloth in its place. To remedy this it is proposed by the patentee to make his rollers elastic by the introduction of a set of flat or elliptical spiral springs, on the principle of the spring braces in common use. The spiral spring is made to surround the end of the strap by which the roller is to be buckled, and the end of the strap is enlarged by sewing on an additional piece of leather to prevent its being drawn through the spring, the whole is then introduced into a receptacle made by sewing a piece of leather upon the girth. The exterior end of this receptacle is diminished so as not to allow the spiral spring to be drawn through, while it allows the strap to pass freely forwards and backwards. As a further security against the spring being drawn out, it is somewhat enlarged at its exterior end.

This invention will no doubt answer the purpose for which the patentee has designed it; but there is nothing new in it, as he would have discovered on reference to the pages of the *Register of Arts*, by which he would have found that the same thing had been invented and patented by others.

DRAWING MACHINE.—To Jean Marie Etienne Ardit, of Newman Street, Oxford Street, in the county of Middlesex, Printer, a patent "for a machine or apparatus for drawing, and for copying and reducing drawings, and other objects or subjects, and for taking panoramas," was granted on the 10th of August, and the specification was enrolled in the Enrolment Office, on the 10th of October, 1831.

The drawings necessary for the illustration of this invention are so minute and numerous, as to render it impossible in our limited space to do more than give the principle of the construction and mode of action of the instrument. A frame, to which is attached an upright sight pillar and a tracing point, is made to move freely on anti-friction wheels and railways, forwards and backwards, as well as to the right or left hand at pleasure; the upright sight pillar has a small pulley at its top, and another at its bottom, over which passes a fine silk line attached to the pencil tracer at one end, and at the other to a small weight which descends within the pillar, and preserves an equal tension on the line. A small sight bead is placed upon that part of the silk

line which passes along the outside of the pillar, and a stationery sight disk is placed in front of the apparatus through which the operator is to look when using the instruments for drawing or copying with it. Thus far the instrument does not differ materially from that invented by Mr. Ronald, and already before the public. The lengths of the different parts are adjustable, that their proportionate lengths may be made to correspond with the intended reduction of the drawing, when the instrument is to be used for that purpose.

To make the instrument applicable to the taking of panoramas, a guide railway is introduced of a curved form, whose curvature shall correspond with the radius of the circle in which the panorama is to be viewed.

PIANO-FORTES.—To William Allen, of Catherine-street, Strand, London, Piano-forte Maker, a patent for "improvements in piano-fortes," was granted on the 20th July, and the specification was enrolled in the Petty Bag Office, on the 20th September, 1831.

Since the introduction of cast-iron frames for piano-fortes, considerable expense has been incurred in drilling the holes for, and fitting in the pins, by which the strings are brought to any required degree of tightness, and considerable difficulty has been experienced in making the tightening pins fit into the holes, so as to turn with facility, and at the same time to preserve their position, and the required tension of the strings. These objects to the cast-iron frames Mr. Allen has remedied, simply by casting the two dove-tailed grooves along that end of the frame where the tightening pins are to be inserted, and driving pieces of wood of a corresponding shape to fill up the dove-tailed grooves, and to receive the tuning-pins. It is evident that by this ingenious and simple contrivance, the expense of manufacture will be diminished, and the instruments will be improved.

POWER OF DRAUGHT AT DIFFERENT VELOCITIES, AND ON VARIOUS KINDS OF ROAD.

TO THE EDITOR.

SIR,—Finding, upon conversation with a coach proprietor, that some very erroneous notions respecting the force required to draw a carriage under different circumstances, prevail amongst those persons who are immediately interested in being well informed on the sub-

ject, I am disposed to believe that the public generally (with the exception of the scientific few) are inoculated with the same errors, well knowing that it is usual to put implicit faith in what "practical men" (as they are called, *par excellence*) promulgate in their own particular avocation. It is almost universally said and admitted, that it requires less power to work a coach at a high than at a low velocity; and as this doctrine may lead some of your ingenious readers into very erroneous calculations, I am anxious to see introduced into your useful work, some account of the extensive series of experiments made by Mr. Macneil (under the superintendance of Mr. Telford), on the London and Liverpool road, in which the force of traction was very accurately ascertained by means of an improved dynamometer, invented by Mr. Macneil.

The general results of experiments made with a stage-coach from London to Shrewsbury, a distance of 153¼ miles, on different inclinations, and at different velocities, are given in the annexed table:—

Rates of Inclination.	Rates of Travelling.	Force required.
1 in 20	6 miles per hour	268
1 in 26	6	213
1 in 30	6	165
1 in 40	6	160
1 in 600	6	111
1 in 20	8	296
1 in 26	8	219
1 in 30	8	196
1 in 40	8	166
1 in 600	8	120
1 in 20	10	318
1 in 26	10	225
1 in 30	10	200
1 in 40	10	172
1 in 600	10	128

From the foregoing statement, it is evident that the power of draught required, constantly increases with the rate of velocity of the carriage; though apparently not always in a uniform ratio; owing most likely to the varying resistance even of the same piece of road in a different state of the weather.

Another piece of information furnished by Mr. Macneil's experiments, and inserted in Mr. Telford's Report, I annex, as it appears to be of great practical value:—

On a well-made pavement, he found the force of the draught to be	33lbs.
On a broken stone surface, on old flint road	65lbs.
On a gravel road	147lbs.
On a broken stone road, upon a rough pavement foundation	46lbs.

On a broken stone surface upon a bottoming of concrete, formed of Parker's cement and gravel 46lbs.

Hoping, Mr. Editor, that you will deem this subject worthy of the consideration of your readers, I remain,

Wine Office-court,
Fleet-street, Oct. 3, 1831.

Your constant reader,
JAMES GREEN.

Remarks on the foregoing by the Editor.

We entirely coincide with our correspondent in his estimation of the data he has obligingly furnished us from Mr. Telford's Report, though we do not take quite the same view of the opinion quoted of the coach proprietor, who appears to us either to have mistaken the true fact of the case, or to have mis-stated it. If he had said that "it requires a less *quantity* of power to work a coach *a given distance* (or journey) at a high velocity than at a low velocity, we think he would have been right, and that such will appear from the data, which Mr. Green has supplied us: we will, however, take leave, to place Mr. Macneill's table in a more convenient form for comparison and examination.

Rate of inclination.	Force required at 6 miles per hour.	8 miles per hour.	10 miles per hour.
1 in 20	268	296	318
1 in 26	213	219	225
1 in 30	165	196	200
1 in 40	160	166	172
1 in 600	111	120	128
	917	997	1043

The second and fourth lines of figures (1 in 26 and 1 in 40) present some discrepancies, which we do not know how to account for. In each of these cases, we observe the increase of force required at the several velocities, is just six pounds, while the increase in the first and third is far greater, and they all vary considerably. The safest way, therefore, to calculate from such data, is to take the total forces at each velocity, which is shown above in 917, 997, and 1043. From these we may conclude, that a given load which requires to draw it, a force of

9¼lbs. at 6 miles per hour, will require
10 lbs. at 8 miles ———, and
10½lbs. at 10 miles ———.

Or, we may say, that it requires about *an eighth* part more of power to increase the velocity from 6 to 10 miles per hour; in return for which we have an increased velocity of motion of *four-tenths*, which is a saving of nearly *three-ninths* (or one-third) in the quantity of power expended in conveying a given load the same distance.

Let us suppose a journey from London to York and back, which

we will call 600 miles (it is nearly), for the convenience of calculation,

At 6 miles per hour, it will take 100 hours
At 10 miles ..... 60 hours
Therefore 917lbs. (total of 6 mile forces) × 100 is 91,700
And 1043lbs. (total of 10 mile forces) × 60 is 62,580

Making a difference of force in favour of high velocity of 28,420lbs.

Or nearly one-third (three-ninths of 91,700) as beforementioned; although it takes a *greater power during the same space of time* to draw at a high than at a low velocity: the gain being in the increase of space passed over by a given power in a given time. No advantage can, however, be taken of this circumstance, with carriages drawn by horses; as horses can exert but very little power of draught at high velocities, which makes it necessary to put four horses to run a coach load, that would require only one horse at a walking pace: and the walking horse, though drawing four times the load of each of the runners, and working three times longer, would be less fatigued at the end of the same journey. But in locomotive carriages the case is otherwise, as in them all the great advantages which result from a high velocity may be made available; and it will be mainly owing to this circumstance that locomotive carriages will ultimately supersede the use of draught horses on the common road. We are inclined to believe that in less than three years hence, this will take place in fast-going carriages for passengers and burthen, and that a more gradual amelioration and change to the same system, will take place in the slower-going vehicles.

The reader, to whom this subject is novel, should be mindful not to mistake the data we have used in our *comparative* estimate, for the real power required to draw a coach load; that being only about a sixth part. Mr. Macneill's statement, given by our correspondent, relates only to *ascending* inclinations; and as 111 lbs. is given as the force of draught in an inclination of 1 in 600, at 6 miles per hour, we may assume from all the data given with respect to the effect upon different kinds of road, that 100 lbs. will be about the average force of draught upon a level, and as the momentum acquired in descents will compensate for the loss of it in making ascents, 100 lbs. is probably very near the truth. Taking that for our datum, the following table will show the comparative quantities of power and draught expended in travelling 600 miles, at the several velocities of motion:—

Ratio of velocity.	Time of journey.	Distance.	Force of draught.	Comparative quantity of power expended.
6 miles per hour	× 100 hours	= 600 miles	100lbs.	100,00
7 miles	× 85+ ..	= 600	104lbs.	88,40
8 miles	× 75 ..	= 600	107lbs.	80,25
9 miles	× 66+ ..	= 600	110lbs.	72,60
10 miles	× 60 ..	= 600	113lbs.	67,80

STEAM CARRIAGES.

Enquiry of the Select Committee of the House of Commons thereon. (Sitting, 5th August, 1831.)

Continued from our last Number, p. 218.

Mr. Walter Hancock, of Stratford, Essex, being called in and examined, said, that he had run his present steam coach about a twelvemonth, and latterly for hire about a month. The principal improvement which he had made, he considered consisted in the boiler, which he described verbally, as follows.

"There are flat chambers which are placed side by side, the chambers being about two inches wide, and there is a space between each of two inches; there are ten chambers, and there are ten flues, and under the flues there is six square feet of fire, which is the dimension of the boiler top and bottom; the chambers are filled from half full to two-thirds-full with water, and the other third is left for steam; there is a communication quite through the series of chambers top and bottom; on this communication there is a large bolt, which screws all the chambers together, the bottom bolt the bottom part of the chambers, and the top bolt the top part of the chambers, and by releasing those bolts at any time all the chambers fall apart, and by screwing them they are all made tight again: we have braces to fasten them; the steam is driven out from the centre of one of the flues, and the water is ejected from the pump at the bottom communication for the supply of water."

In answer to other interrogatories Mr. Hancock said, that the fire passed between the boxes, the sides of the boilers form, as it were, the chimnies. He had worked the boiler as high as 400lbs. on an inch; but the average pressure on an inch was from 60 to 100.

Taking the average of roads, he worked at about 70 lbs. upon the square inch. The present carriage contained 100 square feet of boiler exposed to the fire.

The stages he ran were 8 miles, (4 miles out and 4 miles in) and he took in water and fuel at the end of every eight miles.

The quantity of water used for each stage was from 7 to 8 cwt., depending upon the state of the roads, and about two bushels of coke; the consumption of the latter being usually one quarter of a bushel per mile, exclusively of one bushel consumed in getting up the steam, before starting.

The boiler is placed behind the carriage; there is an engine-house between the boiler and the carriage; the engines are placed perpendicular between the passengers and the engine-house, and the fore part of the vehicle is for the passengers, so that all the machinery is quite behind the carriage, and the fore part of the carriage entirely for the convenience of passengers. At present takes ten passengers, but provision was making to carry fourteen.

The present carriage weighs from three tons to three and a half tons, with fuel and water.

A steam coach requires broad wheels, perfectly upright and flat on the outside of the tire. The tires of the present wheels are about three inches and a half: the diameter of the hind wheels is four feet, the diameter that should be used for a steam coach is however, at least five feet.

"A broad wheel on gravel is considered to be a great advantage; but a great disadvantage on a road which is between wet and dry."

The axletree of the present carriage is made precisely the same as the common axles now in use, straight and merely bent at the end, and a chain pulley on the nave of the wheel communicates with a corresponding chain wheel on the crank shaft of the engines; the size of these pulleys being alike, the power of the engine is the same exactly as though it were applied to the wheel itself.

The engines, which are two in number, are placed four feet from the axletree of the hind wheels, and the communication of the chain is to allow the work to be put on springs, and the play of the carriage up and down is accommodated by the chain. The cylinders are 9 inches in the bore, and the pistons make a 12 inch stroke.

In the experience which Mr. Hancock had had with the working of his boilers, he said he found that they never required cleaning, that the ebullition was so rapid, and the action of water so violent, that it would not allow any dirt to fix.

The boiler will last, in locomotive engines, from a twelvemonth to two years; the iron is about the eighth of an inch thick: there is no annoyance either from smoke or from waste steam. The chimney is not seen.

Horses are not frightened by the carriage, not one in a thousand will take the least notice of it; occasionally a horse may shy at it.

The noise made is only one-third of the noise of a common stage.

No noise is made by letting off steam. It is divided and thrown off from the fire in every direction, and is "instantly consumed;" the force is spent.

The boiler will hold but a small quantity of steam; it is let off from the safety valve as fast as it is made; there is no capacity for accumulation; the fault of many other boilers is, that if any accident happens there is a complete explosion.

Mr. Hancock mentioned to the Committee the following instance of the inexplosive effects of the bursting of one of his boilers—He said he was travelling about nine miles an hour at the time, the boiler was the twenty-fourth part of an inch thick; he was working then at 100 lbs. on the square inch with thirteen persons on the vehicle that he has now in use, and all of a sudden the carriage stopped, and for what reason he was at a loss to know; he got from the stage seat and went to the engineer to ask him what was the reason he had stopped the steam; he told him he had not, and having applied his hand to the guage cocks, he found there was neither steam nor water in the boiler: consequently he knew that the boiler was burst; but the passengers did not know it, as they heard no noise, but Mr. Hancock showed them that it was so, by taking the boiler from the carriage and unscrewing it, when four large holes were discovered. All the water was driven out of the boiler,

yet nobody sustained any injury, nor even heard any report; there was no steam, and there were no symptoms in any way that the machine itself had burst.

The length of the carriage is about 16 feet, and the room the boilers occupy is about 3 feet.

There is no difficulty in turning a corner that any horse and carriage can turn.

By applying the hand to a lever the motion is reversed, and the carriage runs backward.

When the carriage is running at eight miles per hour, by turning off the steam it can be brought to a dead stop in the space of 12 feet; but by backing the engines Mr. Hancock thought it possible to stop the carriage, when running at eight miles per hour, in the space of 4 feet.

Mr. Hancock considered the most equitable mode of charging the tolls upon steam carriages would be as other coaches are charged; or in proportion to the number of persons that are carried. He considered it much better to construct a machine both for passengers and machinery on one arrangement, than to have it divided: the reason he gave for it was this, when a new road is made, the object of the proprietors of that road is to get as heavy a roller as they can, even if it requires eight horses to draw the roller; they do that in order to imbed the gravel to make it solid, and the nearer that steam coach approaches that roller, the better it is for the propelling wheels.

The power of his present carriage in travelling was not equivalent to the power of a stage of four horses. He considered, that in a common four-horse stage coach, that they are exerting a power of twelve horses and a half each, because they take that number of horses to do the work during the day, and that two twelve-horse engines will more than do the work of 48 horses. (The power of his engines was about eight horses.) Thought there were no hills to be found, upon which horses travel, but what a steam coach would propel itself up.

Mr. Hancock calculated his expences at from three to four pounds a day, including all charges attached to the coach, wages for engineer, steersman, fuel, oil, &c. in travelling one hundred miles; the work of which would be done in eight hours, but the stoppages and one thing and another will take up two hours more.

Mr. Richard Trevithick, *being called in, and examined,* 12*th Aug.* 1831,

Stated that 26 years ago he invented a high pressure steam engine and a locomotive engine, and since that time Boulton and Watt's engines have been thrown aside in Cornwall, and the high pressure steam engines, with the improvements upon the boilers he had made, had been throwing Boulton and Watt's engines constantly out of use, there being not one of those now in use in the mines. The average of the duty of Boulton and Watt's engines, about 20 years ago, was taken by Mr. Gilbert, which gave about 17 millions of pounds, lifted a foot high with a bushel of coals; and

sometime after that, Mr. Gilbert made a Report in the Transactions of the Royal Society, that he had found one of Mr. Trevithick's high pressure engines in Cornwall was doing 75 millions; and in the same report he stated, that they were doing nearly as seven to 28 or four to one, and as ten to one on the atmospheric engines. He had been abroad for a good many years, and had nothing to do with steam carriages lately, but contemplated to do a great deal on common roads; railroads were useful for speed, and for the sake of safety, but not otherwise, every purpose would be answered by steam on common roads.

His engine was especially applicable to steam carriages, as it works without water; and the Manchester carriages used four tuns a day, two tuns that they take in when they start, and two that they take in midway of their journey; there is that weight to carry, and the loss of time.

Conceived steam carriages to be applicable to every purpose a horse can effect.

The bursting of boilers had been occasioned by the boilers being left under gauge (neglected to be duly charged with water), and by their getting foul and incrusting with salt from using salt water, the low-pressure engines had burst as well as the high-pressure; if the tubes of the boilers are heated red-hot, and the engine is standing at the time the water is still in, the boiler is quiet, but on the engine setting to work, a discharge of steam from the boiler to the cylinder causes a great ebullition in the boiler, and the water splashing over the hot sides makes a superabundant generation of steam. The space that would be filled instantaneously from the hot tubes being suddenly cooled, the space occupied by that superabundance would fill three hundred times the space usually allowed for steam, and a safety valve of five times the size would give no relief, or not in time; a proof that a high-pressure steam engine boiler has not been broken generally by the pressure of the high steam, but from being heated, is afforded by the portable gasholders, which are about ten inches diameter, and the sixteenth of an inch thick, and they are charged with 30 atmospheres, or 450 lbs. each without danger; an accident never happens to them, and the pressure is not so great as half of the strength of iron; the boilers of steam engines in Cornwall have burst that have not been loaded to an eighth part of that pressure for the same substance and size of boilers; therefore that is a proof that they must have been broken by the heating of the boiler, and suddenly cooling it. The gasholders have never been heated and have never been injured; he had known instances where by turning cold water into a red-hot boiler they have exploded. The boilers to the high-pressure steam engines on his construction are cylinders, one in the other, the inner cylinder containing fire, and the outer cylinder surrounds the water and leaves a space of about a foot between the two tubes for water. Where they have been neglected the fire-tube had been made red-hot, and the splashing of the water over the hot tube from the ebullition occasioned by the escape of steam, had burst the boiler by the

water flowing over the red-hot sides, and generating steam faster than it could be discharged; but by his inferential engine, that could never be the case.

Mr. Trevithick thought that the roads would not be injured so much by steam carriages in future as they had been, because there will be no need to chain the wheels; by putting the valve to the stop, the steam going off that has never yet been applied, there is no need to chain the wheel; if the steam be prevented from escaping, the piston must stand still, and it can be let down as gently as possible;* they may either stop instantly, or go as easily as they please; the throttle barrel will answer the purpose to throttle between the cylinder and the discharge pipe; which would be a saving of the roads.

Thought the roads would be less injured by steam carriages than by horses, because the wheels will have very little more to carry now than they have with horses, and there are no horses' feet to injure the road, therefore that part of it is saved; the engines now will be so very light that it will be scarcely felt; the power to draw the carriage will be very little more than the weight of harness on the horses.

Did not think the road injured so much by the wheels, there is less *friction*; if a two-inch wheel goes two inches deep, and a four-inch wheel goes only one inch deep, there is two to one difference in the *friction*, for the ascent in getting up out of a two-inch rut requires a great deal more friction;† the wider the wheels, though the greater extent, the less the friction; they use wide wheels to go over soft ground on farms to prevent their sinking; there is a great friction, for it is always going down hill, and the friction is pulling it up hill; there is a power thrown away, but that would not have been the case with a wider wheel.

He considered there was "no state of the road in which wide wheels will do an injury; if there was to be a wheel of an inch in diameter instead of six inches, it would be like a stamping-wheel cutting the road constantly, but the width of the wheel takes off that; the tenacity of stone is equal to the weight."

The separation of the materials is not so likely to take place with wide wheels as with narrow; and there is a much greater weight upon one pebble than is thrown on two or three, double the weight is thrown on one pebble than would otherwise be; then that pebble is crushed, for the stone does not bear strongly enough together to resist it.

For this reason, the operation of horses' shoes must be much more injurious than that of broad wheels. He did not agree with a previous witness that there are certain states of the roads in which the widths of the wheel would occasion a loss of power.

* This remark of Mr. Trevithick's appears to us to convey a most valuable suggestion to steam locomotionists.—Ed.

† Mr. Trevithick is here scarcely intelligible, by his constant misuse of the term *friction*, in some cases applying it to force, and in others to resistance.—Ed.

In answer to the unfounded objection, that there is a slipping or sliding in the wheel of the steam carriage, Mr. Trevithick said, "When the trial for the premium given on the Manchester railway was decided, the engines ran for a certain time, and the strokes were counted, and the distance was measured, and there were remarks made upon that day's performance, they found, by measuring the periphery of the wheel, the number of the strokes made, and the distance run, that there was not the *least variation whatever;* they could find no difference. That was on a railroad, and there is much less liability to slip on the common road.

The cylindrical wheel, with the horizontal axle, is the best for the road.

There is no ascent that any common carriages go over, where the steam carriage will not go down the hill with one wheel chained; no road in the neighbourhood of London that they would not run down with one wheel chained; that is, only one quarter part of the weight of the carriage, if the wheel is chained, if you are drawing up hill with two or four wheels driven by an engine, by their all turning round, they are as likely to go up hill. One wheel ought to put it up hill. It will go up a hill of double that ascent without slipping.

Increasing the breadth of the wheel will increase the friction, because that does not tend to make a rut. In making a rut there is a very great difficulty in the wheel getting out of that rut, for there is no footing; but where it does not sink, that is not the case.

A wide wheel may tend to crush the pebbles and wear them, but that will be very trifling indeed compared to the effect of a narrow wheel; if you have a hundred weight upon a wheel of an inch wide, and a hundred weight upon a wheel of two inches wide, that one of an inch wide will break ten times as many pebbles as the other; every inch it goes will break stones; a wide wheel does away the injury.

A carriage making one turn only, it is easier for the wheels to go on the same track; but if you wish to take the average of the duty, they never ought to go in one track: one track produces a burr, and the other smooths it down. In the course of time, going every day backwards and forwards, the work will be done easier.

If the wheels were cylindrical, with their axle horizontal, and double the diameter, it would go easier for the machine; but then that would load the machine in going up hill with an unnecessary weight; nevertheless it would benefit the road, as it would have a longer bearing on the ground; for it is a larger arch.

With respect to the engine, he did not know any material objection, except that it would throw the engine very high; it would be top heavy; did not think it would be convenient to make wheels above six feet.

In dispensing with the water in his new engine, Mr. Trevithick said he would save three-quarters of the fuel; every time the force of steam was doubled, seventy-five per cent. was saved upon it. His engine would not take one quarter part of the

fuel; and one charge of water will do for a month. He had just taken out a patent for an engine.*

He condensed with a sufficient rapidity to take from the piston the pressure of the returning steam. Mr. Trevithick told the Committee "there was an engine which had been working with high steam and one of his boilers, and the cylinder was inclosed with brick-work, to keep off the external air; while he was abroad they took down the brick-work, and set it at a distance from the cylinder of four or five inches, and turned the draught from the fire round the cylinder to keep it off, and from that made more than sixty per cent. difference in the fuel; if the engine was doing forty millions to a bushel of coals before, it then did sixty-three millions, and they burnt five bushels of coals to keep the cylinder hot; if they had put that under the boiler, it would have done forty millions, as before; but in putting in five bushels round the boiler, it did three hundred and fifty-six millions; then the difficulty was to know how it would make that difference; he could not at first make it out; however it turned out afterwards to be the steam; when coming in upon the piston, the cold sides of the cylinder took out a part of the heat; these are single engines; the steam is returned under the piston upon the engine going that stroke again: the cold sides of the cylinder caused a dew by the steam; the steam was expanded to full four times the space; by the time it had gone a quarter part it was shut; then it was expanded; it was entirely cooled by itself; but when it came to touch the cold sides of the cylinder, it hung about them like a dew; the moment there was a communication to the condenser, that instant it expanded, and it threw itself into a second ; the next stroke threw that heat again into the side of the cylinder, the weight of the cylinder was about six tons; if it had taken out one degree each time, that would have taken out more than the engine burnt."

Mr. Trevithick did not think that the tolls should be heavier than just to pay for repairing the road, whatever it may be; people are not to get their maintenance out of roads; and if the steam carriages do not injure the roads half as much as a common carriage, they should not pay half so much.

A steam carriage weighing four tons would do nothing like the same injury as a horse coach of the same weight, for they have narrow wheels and these have not; and there are no horses' feet.

If the toll was charged according to the injury done to the road, it would be not more than half.

Under the present circumstances there is a difficulty in applying steam carriages to the present roads with the present ascents; it is a question whether it shall go over the road, for the weight is too great; but if the weight is done away, and three to one in power added, it will be possible to do it, and he had no doubt it would be effected on the new principle of his engine.

* See description in our Number for last month, page 198.

He thought that the steam engines already prepared were *between sinking and swimming at present, but that his improvements would make them swim.*

In reply to the question, would it not lighten the weight of engines, if you had fixed stationary engines to pump gas, fifty atmospheres for instance; and shift the vessel containing it at each stage, Mr. Trevithick said, we do not want air or gas.

A vessel that held it would be so heavy, it would not carry its own weight; the vessel it was compressed into would be of very considerable weight; a cubic inch of water will fill a cubic foot.

In his application of power to a steam carriage, there would be no danger of bursting; that is prevented: for this reason.

"There are five separate cylinders, the one encircled in the other; and if the boiler, or the inner circle burst, there are four other circles that might take the pressure, one after the other, before it can externally explode, which outer circles are never heated; and the boiler can never be heated or low, because the steam that is made use of by the engines is returned every stroke into the boiler, and provided an engine is tight, it may work for ever without a fresh supply of water."

You have a less boiler; by having a less boiler it is lighter: it is much stronger by getting a greater pressure; there is 75 per cent. on the fuel; if you take the average of the advantages, it will save daily nearly ten to one on travelling engines.

That will render it necessary to have a chimney in a steam carriage?—A chimney is not necessary for the sake of draught, if there is a forced draught; the engine, of which I have produced a drawing, is made for a ship, where we are not bound to height, but five or six feet would be quite sufficient.

IMPROVEMENTS IN WHEEL CARRIAGES.

By Lewis Gompertz, Esq.

TO THE EDITOR.

Sir,—From the long period elapsed since the publication of my substitutes for carriage wheels, (termed *scrapers*) for producing their own railway, or of escaping obstacles, and from none of the numerous plans* I have produced having yet been adopted, I scarcely feel entitled to hope a favourable reception of any others I may venture to offer to public notice; but en-

* See "the Repertory of Arts," No. CLIV. second series, for the first pans; and the numbers for June, 1821, and my small work "Moral Inquiries" (Simpkins and Marshall, Stationers Hall Court), fou succeeding plans; also, "Dr. Jamison's Dictionary of Mechanical Science" under "wheel."

couraged by several improvements, which have of late suggested themselves, also by the existence of your excellent periodical, for the circulation and promotion of mechanical science, I shall hot hesitate occasionally to solicit the favour of a small space of its pages for their insertion, or of any others that may occur.

But what I now beg to submit, is a species of scaper which though in the whole apparently inferior to two of the former plans, has many advantages. This is more properly an *appendage* to a wheel, than a *substitute* for one: it may be entirely executed by in ordinary workman, and may be applied to a common cart, coach, &c. without the slightest alteration of the same, or of the wheels. It consists merely of eight straight bars (more or less) *a a*, with projections or feet *c c*; every end of each bar being moveably jointed by an axis to the next bar, so as to form a polygon to envelope the wheel *b b*, which rolls within it, while each foot successively comes to the ground; the polygon continually changing its shape as it goes (see figs. 5 and 6): and this must, therefore, be larger than what is just sufficient to contain the wheel, which must have a rim to keep the polygon on it; or the bars must be groved for the same purpose. Fig. 7 is one of the sides; *e e* are the feet, which are flat on the bottom: but the external parts should be rounded off to prevent their rubbing on the ground when coming to their bearing; and the bars must be only half their other thickness where they join, in order to prevent an even surface to the rims of the wheel.

One of the disadvantages of this plan under the others is, that the scaper has eight feet, instead of four, and consequently encounters double the number of the inequalities of the ground; but then the feet in this have no rolling motion on the ground, which the others in a degree possess. The friction of the rims of the wheel is also against this plan; but its simplicity and some other circumstances are in its favour.

This plan might be varied by having two small wheels in the envelope instead of one; which then, instead of forming a polygon, would resemble a chain going round two rollers (as in fig. 8); but this plan would present great difficulty in turning; besides which, some contrivance would be necessary to keep them from falling off the wheels.

I have the honour to be,

Sir,

Your most obedient Servant,

LEWIS GOMPERTZ.

AMERICAN PATENTS.

For an Improvement in the art of digging and procuring Gold from the Mine, by the use of a Machine. HENRY JORDAN, *Oglethorpe County, Georgia, October* 1.

A BOLTER, covered with wire work, receives the earth to be washed; this wire grating retains the stones, and larger masses, whilst the smaller pass through the meshes. These are received in a hollow cradle, sometimes called a rocker, forming about a quadrant of a cylinder, and which is placed immediately below the bolter. To this cradle a vibratory motion is given by means of a crank, whilst a stream of water is conducted upon its contents, to wash off the lighter particles, and leave those of the gold behind. From the rotary motion given to the bolter, the vibration of the cradle is derived.

There is no claim made, nor does the specification accord with the allegations in the petition. The machine has nothing to do with the "digging and procuring gold from the mine," but is merely intended to wash it after it has been so procured.

For a Machine for washing the Wool on Sheep, or for washing it after it is shorn off, or for washing Hats out of the colour, also for the purpose of washing Clothing. CHARLES HARRIS, *Snow Hill, Clinton County, Ohio, October* 1.

To wash sheep, a box capable of holding water is prepared; within this box two flutter, or dash wheels, are made to revolve: between these wheels the sheep is to stand, with his head out at an opening in the box, provided for that purpose. An open wire screen, or grating, on each side of the sheep, is to keep him from contact with the wheels. "The machine may be propelled by hand, by horse, by steam, or water power." "The water is thrown by the motion of the wheels on the sheep with such velocity, that the wool will be immediately washed perfectly clean. In washing hats out of the colour, or clothing, a reel will be put between the grating, on which the article will be hung, that may require to be washed."

For an Improvement in the Mode of separating Gold and other precious Metals, from the earthy substances with which they are combined. ROSWELL KING, *M'Intosh County, Georgia, October* 1.

A CYLINDER made of wood, or metal, four feet in diameter, and ten feet in height, is placed vertically, and has a piston and dasher, much like those of a common churn, and which is to be made to work up and down in the same manner, by any sufficient power. On the outside of this cylinder is placed a tube, which extends from

the top of it to the bottom. This tube is for the purpose of conveying the earth to be washed, into the cylinder, below the dasher; it is, therefore, left open at its upper end, and at its lower communicates with the inside of the cylinder. When water, and the earth to be washed, are put into the cylinder, the dasher is worked, the muddy water produced is to be let off from openings at different heights in the cylinder, and the gold, which, from its gravity, will settle to the bottom, is to be removed, either alone, or combined with quicksilver, and in mixture with the heavier materials.

The claim is to the mode of separating gold by means of the above described machine.

For an Improvement in the Mode of separating Gold and other precious Metals, from the earths and stones with which they are often found combined, called "vibrating cylindrical and circular Troughs," ROSWELL KING, *M'Intosh County, Georgia, October* 1.

THIS machinery consists of a trough which is a longitudinal segment of a cylinder, of about 10 feet in length, and 3 in diameter, and of a circular trough, of about 5 feet in diameter, and 6 inches deep, with their appurtenances.

The cylindrical trough, or cradle, is made to incline a little towards one end, and it is separated into compartments, by several partitions, reaching across it, but, (we suppose,) leaving an open space between their lower edges and the trough. The earth to be washed is put, with water, into the upper division, and a vibratory motion is given to the trough; or the contents are agitated by means of a vibrating bar placed above the trough, from which dashers project down between each of the divisions. The earth is thus to be washed off, and the gold collected at the lower end of the trough. The circular vibrating trough is sometimes added to the cylindrical one, and is used to receive the materials which have been partially washed in the cylindrical trough; it then completes the operation. This trough is placed horizontally, with an iron axle in its centre; a vibratory motion is to be given to it by means of a crank, and the waste matter runs off at a spout, or an opening in its rim. The invention claimed, is the before described mode of separating gold, &c. and the machinery by which it is accomplished.

For a Machine for mortising and tennoning. ELISHA MUDGE, *Brookville, Genesee County, New York, October* 1.

THE mortising machine is intended, principally, for the hubs of wheels, but it may be used for other purposes. A stout frame is made, on the sills of which there is a sliding piece hollowed out to contain the hub to be mortised, and having attached to it screws for confining the hub in its place, and a graduated circular guage, for laying off the mortises. At the upper part of the frame is a crank

for working the mortise chisel, and another for turning an auger to bore a hole in the hub, to allow the chisel to begin its work. The tenons of the spokes are formed by a notched chisel, which cuts a shoulder on each side, and which is worked up and down by a lever.

There is not any particular part designated as the invention of the patentee, but he has taken the machine as a whole, and, as such, claims it as new in the following terms: "I have never seen, heard, or read, of a like invention. I think I may claim this as exclusively my own, without fear of contradiction."

Specification of a Patent for an Improvement in the Machine for cleaning Wheat of every description, commonly called the Wheat Fan. Granted to WILLIAM C. HAWLEY, *Brookfield, Fairfield county, Connecticut, October* 1, 1830.

Be it known, that my improvement in the wheat fan is as follows: Beneath the hopper into which the grain, or other seeds, are put, for the purpose of being operated upon by the machine, is placed a revolving cloth, or apron; the *cloth* (so called) may be made of leather, canvass, or other suitable material; and, of itself, forms the bottom of said hopper, upon which the seeds, or grain, may rest. Upon one of the rollers around which the cloth passes, and upon the end of said roller, is fixed a pulley, or band wheel, of eighteen inches diameter, more or less. Upon the end of the same roller is fixed the crank by which the machine is put in motion. A pulley is also fixed upon one end of the fan wheel's shaft, of six inches diameter, more or less, from which a band passes to, and around the eighteen inch pulley before mentioned.

Thus by turning the crank, the fan wheel is put in motion, and also the revolving cloth by which the seed, or grain, is drawn from the hopper and precipitated upon the sieves, or riddle; the machine being made like most fan mills now in use, with the exception of the revolving cloth, &c. as above specified.

That which I claim as my invention and improvement, is, the application of the revolving cloth as above specified, for the within mentioned purposes.

WILLIAM C. HAWLEY.

GEOLOGICAL MODEL.

IN the last session held by the Society of Arts, two models representing part of the coal-field of South Wales, were presented to them by Mr. RICHARD COWLING TAYLOR, F.G.S., to whom was awarded in return the *Gold Isis Medal* of the Society.

"The two models represent the same country, namely, about eleven square miles north of Pontipool, in the most valuable part of the South Wales coal-field. One of the models is intended to

exhibit in relief those parts which would form the subject of a map, namely, the surface, and the objects on the surface. The other model shews the geological structure of the country, distinguishing the beds of useful minerals, and the adits or galleries by which they are wrought, as well as the faults or dislocations of the strata, as far as they have been traced.

"The tract belongs chiefly to the British Iron Company; and the models have been constructed from surveys, both mineral and superficial, made professionally by Mr. Taylor, in the years 1825-6.

"The vertical and horizontal scales in these models approach more to an equality than they do in most others, and therefore there is far less of that distortion which must necessarily result from the use of two different scales.

"The lowest point shewn in the model is 350 feet above the sea; the highest elevation is about 1600 feet. The strata incline, at an average, about 2½ inches in a yard, or 350 feet in a mile. The lowest bed shewn is the old red sandstone, over which lie 400 feet in thickness of calcareous beds, forming the mountain limestone, and these are covered by about 1600 feet of coal measures.

"There are about twenty beds of coal, the aggregate thickness of which is nearly sixty feet: of these, six beds are in working, and yield upwards of 30,000 tons per acre.

"Alternating with the coal beds are others of clay-iron-stone; the best alone of which are worked, producing about 15,000 tons per acre. Alternating with the beds of ironstone and coal are ten beds of clay, of good quality, for fire bricks.

"The middle part of the series consists of sandstone, in which are opened many quarries of excellent building stone. Towards the top of the series the sandstone becomes schistose, and is extensively quarried for tile-stone, paving flags, and slabs for tombstones.

"The whole of the coal-formation lies above the level of the river, and therefore the contents of this valuable deposit are easily got at; while the slope itself, from the top of the hills to the river, presents a very interesting natural section, illustrated and verified by the numerous adits and other excavations."

MISCELLANEOUS.

Silk Worms.—By some recent experiments which have been made in France, it appears that silk-worms may be entirely fed upon the leaf of the scorzonera, or vipers' grass.

Bottoms of Ships.—The Spaniards cover the bottoms of their ships with a cement composed of lime, recently slaked, and fish-oil, made into a paste, and laid on with a trowel. This cement hardens when in contact with salt water, and acquires great solidity. It is advisable, however, before putting on this cement, to apply the usual coat of pitch, and to wait until the latter becomes quite cold.

TORTOISE-SHELL—At San Blas, on the coast of Darien, a small settlement of Indians is established, for the sole purpose of taking turtle. It is under the management of three English, two American, and three Columbian traders, who make a vast profit from the shell. The quantity of tortoise-shell taken by them amounts, on an average, to 15,000lbs. per year, the value of which is about 28,000*l*. The produce of them varies very much, according to the nature of the season, as in some years they take as much as 32,000*l*. worth of shell, an enormous produce for one out of the many like establishments, on this coast. It is a curious fact, that the handsomest shell, and consequently the most valuable, is stripped from the animal while living, the beauty of the shell always becoming less as the animal dies. The dreadful torture which the creature endures by the operation, finds no consideration in the minds of the traders.

EARTHQUAKE AT SAMOS.—Samos has lately been visited by an earthquake of an extraordinary nature, for it produced a large opening in one of the highest mountains of the island, from which suddenly issued an enormous torrent of water, overflowing the country, and making its way to the sea. By degrees the inundation subsided, and terminated in forming a river, which has its source at the opening formed in the mountain. If the river should continue to flow with the same abundance, it will be a great benefit to the country.—*French Paper.*

VERDANT HAY.—In Russia it is usual to preserve the natural verdure of hay. As soon as the grass is cut, it is, without having been spread, formed into a rick, in the centre of which has been previously placed a kind of chimney, made of four rough planks. It seems that the heat of the fermentation evaporates by this chimney; and that the hay thus retains all its leaves, its colour, and its primitive flavour.

IMPROVED PADDLE-WHEEL.—An American paper informs us, that a paddle-wheel has been invented by Mr. Uri Emmons, of New York, which promises to be useful to vessels propelled by steam. It is composed of a cylinder or drum, about the dimensions of those now in general use, and may, without altering or injuring the wheel-house, be adapted to boats now in use. The wheel or drum is made air and water tight, and forms a large revolving buoy—on its periphery or outward surface are fixed floats or paddles set in a spiral form, so far projecting as to take a sufficient hold of the water to propel the boat. On the journals of the shaft are placed friction wheels to ease the upward bearing of the buoys. The spiral form of the paddles will cause them to enter and leave the water freely, and wave it diagonally from the sides of the boat—thereby preventing the water from breaking and foaming around the sides. In case of accident, the buoys will prevent the boat from sinking, and their upward force will

keep her from taking too great a hold of the water, and consequently add to her speed.

INDUSTRY OF BIRDS.—Dr. Steel, who lives near the mineral springs of Saratoga, in New York, has ascertained that the bank swallow (*hirundo riparia*) knows how to vary, according to necessity, the construction of its nest. If it finds sandy banks, it bores holes in them, and thus forms for its future family a commodious habitation, into which none of their enemies can enter. When this resource is wanting, it approaches the houses, and, although less accustomed to man than the swallow of the windows, it attaches its nest to granaries, farm-yard sheds, and similar edifices; and then, it being necessary to build, instead of to dig, it selects materials, transports them, and puts them in their proper places. It thus appears that this species of swallow has not essentially the habits indicated by its specific name; but that it will live contentedly whereever it can find food, safety, and the charms of society; for isolated families, or solitary nests, are never seen. A little colony, which established itself in the neighbourhood of Saratoga in 1828, increased so rapidly, that in 1830 it consisted of several hundreds of nests.

ON THE ORIGIN OF THE ACTION OF THE VOLTAIC PILE.—An important discussion is at present in progress relative to the original source of electricity in the Voltaic pile, not originating with, but to considerable extent renewed by, the endeavours of M. A. de la Rève, to prove that chemical action is the sole cause, contact of dissimilar metals having no effect. This has been vigorously controverted by MM. Pfaff, Marianini, &c. M. Mattenci has made some further experiments on frogs, in which he first assured himself that there was no chemical action between distilled water perfectly free from air and zinc, either alone or in contact with copper. Being sure upon this point, a prepared frog was then suspended from a rod of zinc, which was fixed at the bottom of a gas jar, and connected with a long copper wire, so that nothing more was required to produce the well-known contraction, than to touch the muscles of the legs with the copper wire. The same effect was produced when the jar was filled with distilled water and with pure hydrogen, and when the animal was washed in distilled water, freed of air, and all animal fluid removed. The experiment was also repeated in vacuo, and in various gases. M. Mattenci is convinced that the mere contact of different metals is able to develope electricity, although he admits, with most philosophers, that chemical action exerts and influence over this force, just as heat does in thermo-electric experiments.

LIST OF NEW PATENTS SEALED.

EVAPORATION.—To A. Ure, of Finsbury Square, M. D. for an improved apparatus for evaporating syrups, &c. Dated September 22, 1831. —Specification to be enrolled in six months.

FIRE ARMS.—To W. Bingham, of St. Mary Hall, esq. and W. Dupe, gunmaker, both of Oxford, for improvements in fire arms.—September 24, 1831.—Six months.

cause it to descend; thus a constant circulation is kept up in the water, which becomes the medium of conveyance of heat from the furnace to the sugar pan.

When it is desired to communicate to the sugar a greater heat than 212°, or that at which evaporation of water takes place, the length of the pipe *f* is increased, that the water may be heated under an hydraulic pressure.

STEAM ENGINE.—To T. Brunton, of Park Square, Regent's Park, Middlesex, Esq. a patent for "improvements in apparatus, rendering the same applicable to steam engines," was granted on the 14th of April, and the specification was enrolled in the Petty Bag Office on the 13th of October, 1831.

This invention, which is also stated to have been the communication of a foreigner, consists in the application of a series of heating receptacles, of the same form, and similarly arranged as those used for sugar baking, to the generation of steam, to be used as a first mover in actuating machinery, and for other purposes.

The furnace and heat receptacles are the same in this case as in the last; but instead of their being connected with a water bath for the sugar pan, they are connected with a steam boiler, of any convenient form and required size. The water space in this boiler is made to descend in front of the fire plate lower than the furnace, and in this position the supply of water is received The flue from the furnace is conveyed through the upper part of the boiler, and is surrounded by a water chamber situated above the boiler. From this chamber the supply of water is obtained; and it will be readily perceived, that the heat which otherwise would escape up the chimney, will thus be rendered available in preparing the water, previously to its injection into the boiler, for its more rapid conversion into steam.

The flue is sometimes made to pass in an oblique direction through the water space of the boiler; and sometimes the heating receptacles are advantageously placed in a horizontal position, above one another; though not directly over each other, but arranged in sets of three, two being placed of equal altitude, with a space between them for the passage of the flame, and the third immediately over this space, at a small distance above them, tha the flame may be made to pass in a zig-zag direction, and act upon the extended surfaces of the heating receptacles.

The claims in all these patents are for the particular applications described of the heating receptacles, by which currents are produced, and a more equal distribution of the heat is obtained.

FIRE GRATE.—To Thomas Gaunt, of Chapman Street, Islington, in the county of Middlesex, Gentleman, and George Frederick Eckstien, of Holborn, in the same county, Stove and Grate Manufacturer, a patent for "an improved fire-grate," was granted on the 14th of April, and the specification was enrolled in the Rolls Chapel Office on the 13th of October, 1831.

The stove designed by these patentees has a grate of a semi-elliptical form attached to a straight back, which is brought much further forward than are the backs of stoves of the usual construction; by which arrangement, three sides, or what is equivalent to three sides of the fire, is in a situation to radiate heat into the room. Immediately over the fire is placed a metallic hood, which receives and radiates into the room a portion of the heat which would otherwise pass up the chimney. The distance between the fire and hood is diminished and increased at pleasure by elevating or depressing the grate containing the fire; and thus is obtained the means of increasing and diminishing at pleasure the draft of the fire, and of preventing the escape of smoke into the room.

The changes in the altitude of the grate is effected by means of projections from the grate passing through vertical slips in the back; which projections are joined together by a cross bar attached to a lever by a connecting link. This lever has on its exterior end a toothed sector, which is actuated by a small pinion whose axis receives a regulating winch, passing through a small hole inth back. This hole, with the pinion axis, is the only part connected with the raising apparatus which is visible in front, which enables Mr. Eckstien to manufacture the stoves in a style at once neat and convenient. Instead of the toothed sector and pinion a lever is sometimes employed for raising and lowering the fire grate.

The radiating hood, together with the moveable grate, form the claim of the patentees.

DISTILLATION.—To Joshua Taylor Beale, of Church Lane, Whitechapel, in the county of Middlesex, Engineer, a patent for "an improvement in certain apparatus for separating a portion of aqueous vapour from the vapour of alcohol in the process of distilling and rectifying spirituous liquors," was granted on the 30th of April, and the specification was enrolled in the Enrolment Office on the 29th of October, 1831.

The means proposed by this patentee for separating the aqueous vapour from the vapour of alcohol are represented by fig. 1, Pl. XVII. where *a* shows a still of the usual construction, *b* a still-head furnished with a number of descending tubes, *c c c*, closed at bottom, and opening at top, into the chamber *d*, which is partially filled with a mixture of alcohol and water, or some other fluid which evaporizes at a degree of heat considerably under that at which water is converted into vapour. The intention of this is to prevent the still-head from ever acquiring a heat above that assigned for it; (about 150° for ordinary purposes,) as by any increase of temperature beyond that would cause it to evaporate and pass along the pipe *g* into the condenser *h* placed in the top of the worm tub, and provided with a series of cold water pipes passing through it, by which the vapour will be converted again into fluid, when it will return by the pipe *k* into the chamber *d*. Thus is obtained a perfect means of regulating the temperature of the still-head, by which all the aqueous portion of the vapour will be condensed and returned into the still, while the vapour of alcohol will pass off by the pipe *e e e*, and be condensed in the worm tub *f*; so that by this simple and ingenious arrangement the distillation is completed by one operation.

As a self-acting regulator of temperature this invention deserves particular notice, and it may be found useful in many other processes in the arts.

Cock, or Tap.—To William Dixon, of Wals-all, in the county of Stafford, Brass-cock Founder, a patent for "an improvement on the cock or tap, applicable to fluids, liquids, and gases," was granted on the 21st of April, and the specification was enrolled in the Petty Bag Office on the 21st of October, 1831.

The improved cock contemplated by this patentee is represented by fig. 4, Pl. XVII., in which *a* shows the barrel of the cock, *b b* the plug made cylindrical, with its lower extremity made hollow for the passage of the fluid through it. *c c c* are perforations for the admission of the fluid into the hollow end of the plug. *d d d d* are two rings or washers, fitting air and water tight upon the plug, made of cork, or other elastic material. *e* is a five-threaded screw, by which the cylindrical plug is elevated or depressed, by means of the handle *f*. When the plug is lowered till the apertures *c c c* come within the lower cork ring, no escape of liquor can take place; but when the plug is raised

till the apertures *c c c* are brought within the enlarged part of the cock, opposite to the barrel *a*, the liquor will pass freely through it. *g* is a set screw to prevent the upper part of the cock from being unscrewed or separated from its body when the plug handle is turned.

The upper part screws against one of the elastic rings, and the discharging nozzle *h* against the other; by which means they can be compressed end-wise at pleasure, to cause them to embrace and fit perfectly on the cylindrical plug.

Locks.—To William Rutherford, Jun. of Jedburgh in that part of the United Kingdom called Scotland, Writer and Bank Agent, a patent for "combination or arrangement of apparatus or mechanism to be used by itself, or applied to locks and other fastenings, for more protecting property," was granted on the 14th of April, and the specification was enrolled in the Enrolment Office on the 13th of November, 1831.

The application of a lock or fastening to boxes sent by mails or other conveyance, containing money or other valuable property, that can be opened only at stated times, seems to be the intention of this patentee. Being a Bank Agent, he has no doubt seen the importance of having the means of transmitting from one town to another, bankers parcels, with perfect safety. With this view he proposes to introduce against the end of the bolt a circular stop plate, to prevent the withdrawal of the bolt, till the circular plate, which is put in rotation by clock work, shall have revolved so as to bring a notch opposite the end of the bolt. Now as this notch can be set at pleasure to any required distance from the end of the bolt, the lock may be secured against being opened by its own or any other key, till any assigned number of hours after it has been locked: and as the rate of travelling is known, the box can be secured from robbery till it shall have reached its destination.

The different parts of this fastening are represented by fig. 2, Pl. XVII, where *a* represents a lock, with a bolt *b* shut into the hasp *c*; *d* is a guide staple, through which the bolt passes, and where it has hinged to it a lengthening piece, which comes in contact with the protecting plate *e e*. The use of the hinge in the bolt at *d*, is, that when it is withdrawn from the hasp, it may be doubled back, to admit of the protecting plates being turned round, and set with the notch *h* at any required distance from the end of the bolt. *f f f* is a toothed wheel, to be put in

motion by the pinion *i* connected with a train of wheel work actuated by a coiled spring, and regulated by a balance spring and scape wheel, so as to move at any known uniform rate. *g* is a clamping screw, for fixing the plate *e e e* in any given position on the wheel *f f f*. The small circles on the plate show several holes for the clamping screw: and *k* shows an index fixed to the frame work of the apparatus, and pointing to the hours on the divided circle of the protecting plate, and to Zero when the notch *h* is opposite the end of the bolt. Hence, in settling the apparatus, the plate must be turned till the index points to as many hours from Zero as it is desired that the box should remain unopened.

When this fastening is used for portable boxes or packages, it must be put in motion, and its motion regulated by springs, as we haved described; but when it is to be applied to closets or safes, the most simple mode of giving motion will be by a descending weight, and of regulation by a pendulum. The actuating weight may then be made to rest upon and disengage a locking bar in connection with the bolt of the lock, at any assigned number of hours after the fastening has been effected. In this case, all that is necessary is to cause the weight to descend down a vertical scale divided into hours, and to raise it to any assigned number when the door is locked. A still further security is obtained by the locking bar itself being prevented from being disengaged by any pressure, except by the descent of the weight, which is made to come, in its descent, into contact with an inclined projection from the lower end of the hour scale; sending it back and disengaging the locking bar from a notch therein.

The claim in this patent is for the means of preventing the unlocking of a lid during any assigned time.

ON ARTESIAN WELLS,

AND THE EMPLOYMENT OF THE WARM WATER BROUGHT FROM DEPTH FOR ECONOMICAL PURPOSES.

[From the Edinburgh New Philosophical Journal.]

WHENCE do artesian wells derive their water, and how do they acquire their power of ascension, which sometimes occasions in the middle of plains, at a distance from hills and mountains, the surprising phenomenon of spouting springs? are questions which have been often proposed, and very variously answered.

The most natural explanation is undoubtedly that which supposes the water of these wells, like that of natural wells, to be derived from the atmosphere, and their power of ascension the hydrostatic pressure of a more elevated reservoir, with which the perforated canal or bore stands in connection. Sometimes, however, the local relations are such that it is difficult to refer the water to such a source, and then it is that the framers of wild hypotheses stand forth with their absurdities. A late observation, which affords a striking proof of the accuracy of the above explanation, is therefore the more worthy of being noticed.

At Tours, on the Loire, an artesian well, with a bore of $3\frac{2}{4}$ inches, which brought the water from a depth of 335 feet to the surface, was damaged, and they were obliged (on the 30th of January of this present year) to remove the tube till within 12 feet of the surface. The water suddenly rushed out, increased fully to a third more than its former quantity, and continued to flow for several hours. It was now no longer clear as before; on the contrary, it brought along with it a great quantity of fine sand, and surprising enough, also numerous remains of plants and bivalve shells; branches of the thorn, several inches long, and blackened, owing to their residence in the water; further, fresh stems and roots of marsh plants, seeds of many different plants, and also fresh water shells, as *Planorbis marginatus*, also *Helix rotundata*, and *Helix striata*. All these resembled those which are found after floods, on the sides of smaller rivers and brooks. This fact is so remarkable, that the truth of it might be called in question, had it not been accurately determined. There result from it the following conclusions:

1. The water of the artesian well of the city of *Tours* must occupy not more than four months in flowing through its subterranean canals, because the ripe seeds of harvest have reached the mouth of the well without being decomposed.

2. As the water carries along with it shells and pieces of wood, it cannot reach its place by filtration through the layers of sand, but must have flowed through more or less irregular canals.

3. The source of this water is to be looked for in some moist valleys of Auvergne and the Vivarais.

The remains of the plants and animals are deposited in the mineral cabinet of the city. As soon as the seeds, five or six in number, are referred to their plants, naturalists will, in places situated higher than the basin of the Loire, be able to make out the points where these subterranean waters are poured out.

It is to be wished that French observers would state how they prove that the waters of this well come from Auvergne, about 130 miles distant. If this shall be proved, the considerable rise of artesian water in other places, where no hills occur near, or where they are bored in the most elevated points in the neighbourhood, will lose every thing puzzling.

This rising is sufficiently remarkable to induce us to communicate some examples from Hericart.

Name of the Well.	Depth of the Well from the surface of the place.	Height of the rise above the level of the Seine, at the Point de la Tournelle.
	Paris Feet.	Paris Feet.
St. Owen.....	150.8	6.2
Same	203.2	11.1
Epinay.....	166.2	24.6
Same	207.8	33.8
Maison Blanche near Paris	121.6	64.6
Mount Rouge at Paris ..	315.5	80.0

The two last wells, exactly those which rise highest above the level of the Seine, are bored on heights, and hence their water remains considerably under the surface of the earth; also in both the deepest of the bore-holes is still above the level of the Seine, in the first seven metres, in the last about one metre.

In the work of Hericart, a fact is mentioned, which confirms the view of artesian wells already given. Gulfs, in which rivers and rivulets lose themselves, are very frequent in the Jura and other similar limestone mountains, and there, where the uppermost bed consists of a clayey soil, which opposes the sinking down of the rain, sometimes proves very beneficial in agricultural operations, by carrying away the superfluous water. In some places, M. Hericart remarks, man has imitated this example set by nature with great effect. The draining of the plain of Palans, near to Marseille, is an example of this. This plain, which is at present covered with beautiful vineyards, was formerly a great marshy basin, without outlet. It was drained by means of great sink-holes, which were sunk down to the underlying porous or cavernous stone, and were connected together by means of a number of ditches or drains. The water which was carried away by these shafts reached, by means of subterranean canals, the harbours of Mion near to Cassis, where it appeared again as spouting springs. Here, therefore, man, without intending it, had artesian wells, not for the purpose of obtaining water, but in order to get clear of it.

The following report, published by M. Bruckmann Kongl, Wurtemberg Baurath, in the *Verhandlungen zur Beforderung des Gewerbfleisses in Preussen*, 1830, Lieferung, No. 4., affords a strking proof how varied the uses are of artesian wells. M. Bruckmann caused to be bored, under his inspection, from August 1827, to December 1829, at Heilbronn, five bore holes for fresh water, in order to obtain the necessary quantity of pure water for the purposes of two paper mills and a flax spinning

mill. Two of the bore holes were sunk to a depth of 60 feet, one to 90 feet, another to 100 feet, and one to 112 feet, under the lowest level of the Neckar. In all of them the water rose nearly 8 feet above the level of the Neckar, and on an average each delivered 40 to 50 cubic feet. The purpose of the borings was perfectly accomplished, even to overflow; but the discovery was made, that the water of all the bore holes had constantly a temperature of 54.5 Fahr. This fact led M. Bruckmann to a very important application of this water, viz. heating the mills with it. The paper mill contained 72,000 cubic feet, a working hall over it 10,800 cubic feet. Both spaces, which contained together 82,800 cubic feet, where the whole winter 1829—1830, through, warmed by means of this water alone to a temperature of 45°.5 F. and 47°.7 F., and when without, the temperature was—24.2 F. The thermometer in the mills did not sink lower than 41° F. even when the doors were kept open. Every miller knows well how much labour, time, and expense, it occasions in hard winters to heat daily, and even in a scanty manner, the water wheels, and with what risk of life it is attended. It was reserved for Mr. Bruckmann, by means of artesian water, to free his water mills from this burdensome evil. He conducted the running water from the Hollander, which still possessed a temperature of 52°.2 F., through tubes into the Wassergasse, and had thus the satisfaction to find that his water wheels, the whole winter through, even when the external temperature was as low as—24°.2 F., never froze*.—*Poggendorf's Annalen*, H. ii. 1831.

ON THE STRAIGHT EDGE.

To the Editor of the Journal of the Franklin Institute.

Mr. Editor,—The difficulty and expense of making straight edges of considerable length, render any improvement in these indispensable tools a desideratum. The usual mode taken to make them accurate, is to secure together three thin bars of steel, and file them to a uniform breadth, or as nearly so as practicable; then to separate them, and compare their edges respectively with each other: if when the ends are reversed and the edges again compared, they should correspond, they may be considered, for all practicable purposes, perfect.

This method being tedious and expensive, good straight edges of more than three or four feet in length are rarely to be met with,

* The period will come when we will be forced to look out for a substitute for coal. If, when that time arrives, no new means of procuring heat economically shall be discovered, we may be able to draw from the great subterranean depository of caloric, and partly by means of the subterranean waters, heat for our various wants.

and highly prized when obtained, When they are required of greater length, a serious difficulty occurs in their use. The slightest lateral deviation from a straight line will, of course, affect the accuracy of the instrument; consequently, the bar must be made so inflexible that it will not bend when inclined to the side, and, of course, becomes a cumbrous tool. To remedy the last difficulty, an ingenious mechanic of this city constructed one of a cylindrical form, of iron cast hollow, about two inches diameter, and turned so thin that its weight was not objectionable, while its form rendered it inflexible to a considerable length, and in use was found quite as convenient as the flat straight edge. The cylinder being first turned in a side lathe, and then ground with emery in a lead cap made to fit the circle, produced an instrument of great accuracy, at trifling expense.

We have been led to these remarks by observing at a workshop in this city, a straight edge so simple and cheap, that we almost doubted its novelty, though we confess such a one never before came under our notice.* It was made of steel harpsicord wire, stretched upon the edge of a board or frame and kept tight by screws—set screws were placed at each end which passed to the under side of the wire, and suffered it to touch the work or not, at the option of the workman. See fig. 5, Pl. XVIII.

The instrument we saw was twelve feet in length, and was stretched to the whole extent of the lathe shears which were finishing by it. The wire being too fine to exhibit the inequalities of the work to the eye, the operator set the points of the screws so far beneath the wire that it should only touch at the more prominent places, and then on passing along the work, discovered, by depressing the wire, where it touched and where it did not. The trouble attending the use of this instrument made it more convenient to use a wooden straight edge for roughing down the work, but its great accuracy made it very valuable in finishing.

We have often seen fine thread fastened to a wooden bow for the same purpose, but such a tool can only be depended on when held to the side of the work, obliging the operator to turn it over whenever he wanted to examine his progress, (an operation inconvenient when working a heavy casting,) because the thread curved by its own weight. No such difficulty is experienced in using the above, as its tenacity is so great, that it will bear a strain sufficient to keep it perfectly straight. M.

CHEMICAL ANALYSIS OF TRUE OIL OF ROSES.

By Professor Dr. GOBEL, of Dorpat.

THROUGH the goodness of one of my pupils from Taganrok,

* It is not new, but has been used for testing the straightness of gun barrels.—EDITOR.

on the sea of Asoph, I received a vial of true oil of roses, which I dedicated to the following analysis:—

It was nearly colourless, but in so concentrated a state, that it gave out an insupportably strong offensive rosacious smell, which caused headache; but when dissolved in spirit of wine, it afforded a most delightful odour. A single drop was sufficient to fill a room for several days with a most agreeable odour of roses. It congealed into a white, foliated, transparent mass when exposed to a temperature of 32° Fahrenheit, but became fluid again on raising the temperature to 72° Fahrenheit. Spirit of wine of 0.815 sp. gr. dissolved at 65.1 Fahrenhiet $\frac{1}{150}$ part of it. A drop required for its perfect solution 8000 grains of distilled water. Owing to the small quantity of the oil in my possession, amounting to not more than 15 grains, it was impossible for me to separate the different substances of which it is compossed, in order to analyze them. I was obliged to rest satisfied with obtaining the proportions of the ultimate constituent parts, which is as follows:—Carbon 69.66, hydrogen 16.06. oxygen 14.29; = 100.

The oil of roses met with in trade in Germany, is very often an adulterated compound. I have about half an ounce of it, but it differs in several respects from the pure oil. It congeals much sooner than the genuine, and requires for its melting again a higher temperature. It is only partially soluble in spirit of wine, and is nearly insoluble in water.—*Schweigger, Seidel's Jahrbuch*, H. 4, 1830.

An inquiry into the cause of the ready Souring of American Flour, and some other faults resulting from the mode in which it is manufactured. With suggestions on the proper means of remedying these defects.

To the Editor of the Journal of the Franklin Institute.

Sir,—Although a number of years have elapsed since it was my business to be connected with the manufacturing of wheat, flour, the bread, hard or soft, made from it; still the circumstauces of flour manufactured in Richmond, Va. having acquired so *respectable* a character, both at home and abroad, while that of Pennsylvania has hardly maintained its ground, and that made in this western, or rather in this interior quarter, is remarked for not keeping well, have all concurred to recal to my mind former observations, and to elicit new ideas. Of the many manufactures carried on in the United States, the making of flour is among the most important. It may therefore be fairly presumed that any thing having a tendency to improve this business, in however small a degree, will be acceptable to the patrons of the Journal of the Franklin Institute, which is devoted to the improvement and extension of the useful arts, and the promotion of the industry and resources of the union.

It will be found that a mixture of different wheats, that is, red, white, bearded, and common, supposing them all of good quality, and equally well manufactured into flour, will make better bread than any one of them simply. On the miller's experience and judgment depend the best proportions of this mixture, equal quantities not being that which answers best; and it is not at all times in the miller's power, from want of the various kinds, to preserve this proportion, his skill is called upon so to proportion what he has, as to bring out the best results.

In the next place, it is a bad system to make flour entirely out of the new crop, immediately after the harvest; such flour will not keep long, and it is not so profitable to the baker; it will neither produce so much bread, or bread of so good a quality as a mixture of the old with the new. Suppose, for the sake of example, that for two months after the crop of any one year comes in, it is mixed with an equal portion of the preceding year, gradually diminished the proportion of old wheat as the season advances; flour made of this composition of new and old wheat, is certain of keeping well, will make good bread, and more of it in proportion than flour used in the same quantity but made entirely of new wheat; here too the skill of the miller governs the result.

There have been, during the last twenty-five or thirty years, many improvements in the making of wheat flour, invented and introduced into this country. I believe that we are actually, if not technically indebted to Oliver Evans, for the "Hopper Boy," the "Elevator," and many other improvements. To lessen the expense attendant on the management of the mill, by cooling of ground wheat rapidly, has been a primary object. But when the rapidity with which wheat passes through all its processes, and is packed into the flour barrel, is too great, it is very evident that it has not sufficient time to cool perfectly, and to *part with its moisture;* and it is probable this is a main cause why our flour does not keep so long. It is a well known fact, that from some defect in the manufacturing, a large portion of our flour soon sours, grow hard, or otherwise spoils. This is a result most injurious to the country, and one which operates very disadvantageously on the miller, the merchant, the baker, the consumer, and the general character of the article in foreign countries.

The following new mode of managing the flour is suggested to remedy the evils just spoken of; and the writer of this is confident that all the good effects proposed, will result from the practice recommended; indeed every miller will at once see the connection between the causes assigned, and the effect produced.

When the ground wheat issues form the mill stone, it is then quite warm, from the friction of the stones; that heat causes the

latent damp that exists in wheat most sensibly to develope itself. To give the meal the greatest dryness, is to communicate to it the property of keeping long, and of readily and perfectly separating from the bran; the best mode of obtaining this dryness is now our object of inquiry.

To accomplish this all important object, it is recommended to the miller to fix an active wind fan, (fan mill,) so as to blow plenty of cool and fresh air among the warm meal just as it issues from the spout of the mill stones. This stream of air would not only cool the meal, but carry off the damp that at that moment is in its greatest state of volatility, in consequence of the heat. The stream of air would go off loaded with the vapour, but still there would remain heat, and consequently expanded moisture; a stream of air from a pair of bellows might, in addition to the former plan, be carried by a hose, and blown into the elevator; and lastly, the meal, when passing from the buckets of the elevator, might be subjected to the action of a second fan.

All this would so operate on the meal, that by the time it was converted into flour, both heat and moisture would be effectually removed; aad there is every reason to conclude that flour made after this manner would keep long, and the meal would also be cool and dry when it arrived at the bolting process; it would most readily be separated into flour and bran, yielding a greater quantity of flour than by the present process.

A miller to become perfectly acquainted with the mixture of wheat that produces the best bread, should have trials made by an intelligent, careful, and good baker. To become a good miller, this is almost essential. It is well known that when wheat flour has been ground very fine, no matter how good the quality of the wheat, and how well soever the flour may appear to the eye, the baker cannot make good bread with it. The appearance of such bread is wettish and doughy, such as when the wheat has been injured by rain in harvest time. Good judges will always prefer the flour that feels hardish, when rubbed between the finger and thumb, as if it were fine sand, and reject that which compresses and is smooth.

Very little has hitherto been written upon the making of flour, every one acting on the knowledge he has acquired from his own experience, and with him ends all the knowledge he has acquired, with the exception of what he communicates to those immediately connected with him.

Should you think what is now communicated to you in this paper likely to do good, or to induce those of more experience to digest their ideas and observations on this subject, and give them to the public, you will publish it, as then some advantage will result from this unpretending effort to benefit the community.

Although it is well known that flour frequently sours in a short

time, and occasions great loss to the merchant; and the dealers in this article, find to their cost, that the western flour is specially faulty in this respect; this is not asserted of all western flour, but only of the larger portion of what passes down the Ohio. A close inquiry into the practice of the western millers, will prove that too little attention is paid to mixing wheats, and to the using of old with new wheat. The mills are small compared with the quantities of flour they produce, and consequently it is too much hurried to have time to cool. Some of the steam mills are so constructed that the whole air in the house is loaded by the steam with more vapour than the air can hold in solution; a large portion of this is thrown into the meal, so that in such places it is certain a bad keeping flour must be made. Yours, &c.

J. R.

Editorial Note to Article on American Flour.

We have thought it proper to give the foregoing letter insertion, as it is one of immense importance to the British as well as the American public; but we no not coincide with the writer in his opinion of the efficacy of the plans suggested. The cooling and drying of the flour as it passes from the stones, must undoubtedly prove of some advantage in preserving it from that early decomposition to which it would otherwise be liable; but we conceive that the evil produced by the heating in the first instance cannot be subsequently remedied: that the effect of this heating is to produce a partial fusion, or melting of the granular particles by the expansion of the water of crystallization, conferring a kind of *tapioca quality* to the grain. Flour which has been heated in the manner alluded to, acquires a yellowish tint; owing, we think, to the destruction of the crystals of the flour, which do not, in consequence, reflect so much light; and such flour, it is well known to bakers, will not make so much bread, as an equal quantity of the more perfectly ground flour; owing to its incapacity to absorb (readily) an equal quantity of water, in the preparation of the dough. The introduction of fanners and other cobling drying apparatus, in the manner proposed by the American writer, would, we think, be attended with great inconvenience; and we are happy in being enabled to add, that the necessity of such cumbersome appendages will be very soon superseded by a new invention, (for which we have just been engaged in procuring the patents,) and can confidently state, from repeated experiments, that the flour never becomes heated by its action, and that it will grind *treble* the usual quantity of wheat by a given power in a given time. We shall, when the specifications are due, give our readers an exact account of this important amelioration in the art of preparing the first necessary of life.

On the Setting of Plaster of Paris. By M. Gay-Lussac.

Every body knows the property of plaster, deprived of water by heat—of forming a hard body with that liquid. The consistence which it acquires is very variable, and those are decidedly the purest plasters which set with the least water. The cause has been attributed, for that of Paris, to the presence of a few parts per cent. of carbonate of lime, but doubtless very erroneously; for the heat necessary to bake plaster, which, on a small scale, does not rise to 150°, (= 302° Faht.) is not raised, in the large way, to the degree necessary for decomposing carbonate of lime; besides, baked plaster does not usually contain free lime, and the addition of that base to plasters of little consistence does not perceptibly improve them. I think that the difference of the various degrees of consistency acquired by baked plasters with water, must be sought in the hardness which they offer in the raw state; a hardness we cannot explain, and which must be taken as a fact. This laid down, I conceive that a hard plaster stone,* having lost its water, will acquire again more consistence in returning to its first state, than a plaster stone naturally soft; it is, in a manner, the primitive molecular arrangement which is reproduced. Thus, we see, good cast steel, from which its carbon has been taken by cementing it with oxide of iron, give, afterwards, by a new cementation with carbon, a steel much more homogeneous and more perfect than that which would be obtained, in the same circumstances, by the cementation of iron.—*Ann. de Chimie.*

Dying of Silk a Permanent Chrome Yellow.—By M. Ozanam.

Cleanse the silk at one heating of two hours, wash and wring it; plunge the skeins in a solution of sub-acetate of lead more or less strong, according to the desired depth of yellow. At the end of two hours take them out, expose them to the air for half an hour, then wash them in a stream and wring them.

Prepare a bath, in which a sufficient quantity of neutral chromate of potash, (about from the fifteenth to the twenty-eighth part of the weight of the silk,) is dissolved. Neutralize the bath with half a glassful of hydrochloric, (muriatic,) acid. Leave your silks in it, during half an hour, at the mean temperature: twist or wring them over the liquor, and wash them in a slight solution of soap, just warm, then in a stream of cold water.

The shades of yellow are varied by altering the quantities of the mordant of sub-acetate of lead, and of the chromate of potash, which must always be deneutralized by hydrochloric acid.—*Recueil Indust.*

* What is commonly called plaster stone, (pierre a platre,) consists of impure masses of sulphate of lime. It is usually mixed with clay, sand, carbonate of lime, and contains animal and vegetable remains. The sulphate of lime contains twenty-one per cent. of water of crystallization. It is softer than marble in general.—See Thenard's Chemistry, II.—Trans.

For an Improvement in the Press for pressing Oil, Cotton, Tobacco, and other Substances requiring great pressure. GIDEON PALMER, *Montville, New London County, Connecticut, December* 14.

THIS press is to be operated upon by the gravity of water. At the lower part of the press a vat or cistern is constructed, which is capable of being filled with water. Within this is placed a second cistern filled with water, and of about one-half of the depth of the former. When the outer vessel is filled the inner one will float within it; and when the water is drawn off from the outer vessel, the inner will tend to descend with its load of water, which, in the press described, would amount to nine tons. An upright shaft ascends from the inner cistern, to which it is firmly attached and secured by braces. This shaft operates upon the arms by which the pressure is to be made. The principle of the action of these arms is that of the toggle joint, each arm presses outwards against the sides or cheeks of the press.

The seed, or other article to be pressed, is placed between boxes or gripes at each side. Against these boxes or gripes followers are forced by means of the jointed arms, which, when the shaft is up, and the press out of action, rise so as to form an angle with each other, and when in full action stand in the same horizontal line. The upper end of the shaft is in the form of a wedge, with its narrowest end downwards. This wedge stands between the inner ends of the arms, and operates, with their own descent, to force their opposite ends out upon the article to be pressed.

The press-boxes or gripes, between which the seed is to be pressed, "are made of bars of wrought iron, lined with sheet iron, bolted and keyed together at the corners in such a manner as to open and shut to receive and discharge their contents with ease and facility."

"What I particularly claim as a new and useful improvement in the oil press is, first, the application of a weight of water to press any substance requiring pressure in the manner above described. Secondly, the formation of the press-boxes, and application of these press-boxes afore described to the ordinary screw and lever press. Thirdly, the wedge as applied to the press above described."

Preservation of Iron from Rust.

A MASTIC or covering for this purpose, proposed by M. Zeni, and sanctioned by the Societé d'Encouragement, is as follows: eighty parts of pounded brick, passed through a silk sieve, are mixed with twenty parts of litharge; the whole is then rubbed up by the mullar with linseed oil so as to form a thick paint, which may be diluted with spirits of turpentine; before it is applied the iron should be well cleaned.—From an experience of two years upon locks exposed to the air, and watered daily with salt water, after being covered with two coats of this mastic, the good effects of it have been thoroughly proved.—*Bull d' Encour.*

AMERICAN PATENTS.

For an improved Smut Machine, for hulling, smutting, and cleaning grain. JEREMIAH COSE, *Sodus, Wayne County, New York, October* 1.

THE grain to be cleaned by this machine is, in the first instance, made to fall from the shoe of the hopper into a riddle, and thence into a smut wheel, which is a wheel of fifteen inches in diameter, and three inches deep; this wheel has an eye of six inches diameter, made like that of a mill stone. The smut wheel is furnished on the under side with a sheet iron grater, or with points of iron, and runs upon a circular bed of sheet iron of the same diameter, and perforated with small holes. The grain passes between the scouring wheel and bed, and runs over eight small screens within the curb inclosing the wheel; thence it falls by a small opening through an air channel, into the eye of the stone. In its passage it is acted upon by an air wheel, or fan, to which the requisite motion is to be given, as well as to the smut, or scouring wheel.

For a Machine for Drilling Rocks for Blasting. JOHN W. POST, *Washington City, October* 1.

THIS machine consists of the drill ordinarily used for the purpose of drilling rocks, but it is to be supported by a frame, standing upon four legs. It is to slide up and down through holes in the cross bars of this frame. The drill is attached to a double bow spring, at its upper part, and is to be loaded with a weight, should its own weight be too small. The drill is to be forced down by the hand in the usual way, and raised by the elasticity of the spring. The claim of the patentee is to "the use of the spring, constructed as above described, and the form of the rod, and its connexion with the spring; or whatever may prove to be original or novel, in the above description."

It is no uncommon error on the part of patentees, to suppose that after they have claimed certain specific things, they have a contingent remainder in certain others which may hereafter prove to be new: but who is to find out the novelty, if the inventor cannot? It is his business to inscribe *nole me tangere* on the part which he patents, and if he cannot tell where to place the label, he may rest assured that others have no interest in making the discovery.

For an improvement in the Action of an upright Piano-forte. JESSE THOMPSON, *City of New York, October* 1.

THE claim attached to the specification will give, to those acquainted with the subject, a general idea of the variations introduced in this action.

"What I claim as new, and as my own invention, is,"

"First, the application of the finger lever directly to the foot of the connecting rod, dispensing with the jack, springs, and all intermediate gearing. By this more immediate operation of the finger lever on the hammer, no time is lost between the touch and the blow: the action is more controllable by the finger; the blow is quicker and more powerful; the hammer can never block; it relieves less from the string; and requires much less depth of touch. The simplicity of its construction renders the work much cheaper, and less liable to get out of order than any known action."

"From this perfection of the action I have been able to render the span of the natural action to six and a half inches, and the others in proportion, without in any degree interfering with a clear and rapid execution. Or the common span of the octave may be retained."

"Second, the placing the dampers below the hammer rail, by which position the dampers fall on the brass strings nearer the middle of them, and thus more instantaneously and effectually stop their vibration, and may be raised by the simpler and cheaper modes herein before specified."

For an improvement in the construction of Saw Mills. JOSEPH NEWTON, *Sweden, Monroe County, New York, October* 1.

THE improvement proposed, is, to have teeth on both edges of a saw, and to construct the mill in such a manner that the log may be sawed in passing either way. There are to be two rag wheels, and two feed hands, operating in reversed directions.

We much doubt whether the advantages derived from this mode, in ordinary sawing, will compensate for its inconveniences. The plank must be cut entirely off, whilst in the ordinary mill they support each other until the last slab is taken off. If any mode of obviating this objection has been devised, it has not been presented to us by the patentee.

For a Machine for cleaning Grain. MICHAEL URFFER, *Upper Milford, Lehigh County, Pennsylvania, October* 1.

THE general form of this instrument is that of the Dutch wheat fan. Instead of the ordinary screens, or sieves, there is a cylindrical revolving sifter, working something like a bolter, the grain passing in at one end, and out of the other, on to the inclined board, where the fan operates upon it. This is the principal alteration from the common arrangement.

For an improved system of procedure in the drying and curing of Tobacco. DAVIS G. TUCK, M. D. *Halifax Court House, Virginia, October* 1.

THE system proposed is founded upon the principle, that in order

to preserve the valuable qualities of vegetable substances, which are to be desiccated, the process ought to be effected within a limited time, in order to prevent spontaneous decomposition; and that to effect this, the operation must be carried on at temperatures within the absolute control of the operator. The whole arrangement proposed by the patentee, is sufficiently simple to be carried into effect by ordinary hands; the principles upon which it is based, are obviously true, and the test of actual experiment has evinced its great value. We shall hereafter give an epitome of the specification, which is of considerable length.

For a cylindrical grate Cotton Whipper. JAMES S. SIMMONDS, *Scituate, Providence County, Rhode Island, October* 1.

THIS cotton whipper consists of a cylindrical grate placed vertically, and inclosed in a wooden box. A shaft passes down through the centre of the cylindrical grate. Arms project from this vertical shaft, and others called fingers, project from the interior of the cylinder, in such a manner, that when the shaft is made to revolve, its projecting arms may pass between those on the cylinder.

The cotton is fed into the cylinder, where, by the rapid motion of the shaft, it is beaten and opened: the seeds and other foreign matter being principally driven out through the grating of the cylinder. There is, of course, a suitable opening for the delivery of the cotton. The claim is to the cylindrical grate; to the fingers inserted within the grate or cylinder; and to the shaft passing through the cylinder, and having two, three, or more arms inserted in it.

For an improvement in the mode of manufacturing Combs. JAMES PITTS *and* CYRUS HOUGHTON, *of Lancaster, Worcester County, Massachusetts, and* JOSEPH RICE, Jr. *of Scituate, Rhode Island, October* 1.

THIS patent is for "a machine for grinding comb stocks, and making combs."

"This improvement consists in several things. *First,* in grinding or preparing the stock for combs, doing that part of the work by machinery, which hitherto has usually been done by hand. *Second,* in a better method for smoothing the teeth from the back, or quill of the comb, to the end of the teeth. *Third,* in a better method of pointing, or rounding the teeth."

A common coarse grit grindstone is used to reduce the horn, &c. to a proper surface, there being under the stone a suitable support and slide to hold and manage the pieces to be so ground; water is to be allowed to run upon the stone during the operation.

The ends of the teeth, and the rough ends of cut combs, are also to be smoothed by grinding. A third stone, with grooves on its face, is used to smooth the teeth. The stones in the two latter cases are to be used dry. The claim is to the *process of grinding* in the manufacturing of combs.

For a Circular Car Receiver. JONATHAN CRANE, *of the City of Schenectady, New York, October* 1.

WE are informed that "the utility of the circular car receiver, consists mainly in the facility which it affords in removing the car, or other vehicle, from one rail to the other. It is believed that important advantages will be derived from its use in removing ponderous bodies of earth from hills into vallies, and that it can be applied with great advantage in graduating for rail-roads: and at the termination of rail-ways, in removing the car, or other vehicle, when loaded or empty, from one rail [track] to the other, whether the rail-ways are parallel, or at right angles."

The principal object of the patentee appears to be to aid in the construction of rail-roads, where embankments are to be made. Suppose a double track to be laid along the embankment so far as it is completed; these tracks are to be connected together by means of a semicular platform, which is placed a little below the level of the rails. A carriage, upon rollers, is adapted to this platform, which carriage is of such a height as just to reach the level of the rails. A lever, or sweep, is attached to this carriage, for the purpose of carrying it round from one track to the other; this it accomplishes by its working on a pin, or fulcrum, placed between the two tracks, and in the centre of the curved platform. A car, bringing earth, is received upon this carriage, and by means of the lever, it may be carried round so as to return by the other track; and a succession of cars may thus be employed, without their interfering with each other. The earth, or other material brought, may be shot down, or unloaded, whilst the car is on the circular platform, or in any required part of its journey.

For sundry improvements in a Printing Machine, called a Power Printing Press. ISAAC ADAMS, *Boston, Massachusetts, October* 4.

WE cannot pretend to give any description of this machine, which in the specification occupies ten pages, and is accompanied by large and complicated drawings. The points claimed, are, "the combination of stationary fly frames, with points for getting register by, on them, with printing presses."

"The object of these fly frames, is to enable the person who lays on the paper to point one sheet, while the sheet previously put on is receiving the impression, and by that means save the time which would be lost in waiting for a frisket to come out."

An apparatus for giving a periodical movement to the rollers and friskets, as described in the specification, and the use of what the patentee calls declension levers, are also claimed.

For an improvement in the Springs of Carriages, and in the method of attaching the Bodies of Carriages to the Springs. JOSEPH IVES, *and* JAMES WALTERS, *Brooklyn, King's County, New York, October* 6.

THE springs used by the patentees, are straight springs attached to the perch, or other frame work of the carriage. They extend out in a line with the carriage before and behind, being horizontally, and being bolted down at their inner ends. To their outer ends a rope, chain, or band, is attached, which rises up, and passes over a pulley, to which the other end of the rope, chain, or band, is fastened. The pulley is fixed upon a shaft, the gudgeons of which turn in two standards, framed in the carriage for that purpose. Other pulleys are fixed on the ends of the shaft, from which ropes, chains, or bands extend, and are attached to the body of the carriage.

When the body is hung, its weight tends to turn the pulley, to which it is attached by the ropes or bands, and in doing so the pulley connected with the springs raise them from the frame work on which they rest.

The claim is to this manner of suspending carriages.

Specification of a Patent for an improvement in the manufacture of Reeds for Weavers. Granted to JACOB SENNEFF, *of the City of Philadelphia, October* 1, 1830.

To all whom it may concern, be it known, that I, Jacob Senneff, of the city of Philadelphia, have invented a new and useful improvement in the manufacturing of reeds for weavers, in which heat is applied for the purpose of straightening the splits or dents preparatory to their being set in the reed, and that the following is a full and exact description of the process, and of the machinery by which the same may be effected.

In accomplishing the end proposed, I proceed upon the well known facts, that wood, or cane, or strips of either, confined in any form, and then submitted to the action of heated water, or steam, or in any way heated, when imbued with moisture, and afterwards dried, will retain the form given to it, whether curved or straight.

I take the strips, or dents, prepared in the usual way for making reeds, and after soaking them in water, arrange them in rows, either upon boards or metallic plates, prepared to receive them, placing them flatwise together, and extending them along nearly the whole length of the board, or plate. Two or more rows may be thus extended, according to the width of the board, or plate, upon one end of which there should be a projecting cleet, or ledge, to sustain them. I cover any convenient number of boards, or plates, in this way, and place them over each other. I then place them in a frame prepared for the purpose, in which pressure may be made upon them, by means of screws, wedges, or otherwise. When thus pressed, they are submitted to the action of heat, and then perfectly dried,

which, if necessary, may be quickly done, by placing the whole in an oven.

For the purpose of giving a practical view of my mode of procedure, I have accompanied this specification with a drawing of the press in the form in which I now employ it, not intending to confine myself to this particular construction, as what I claim is not the form of the press, but the process for straightening splits for reeds, upon the principles above described, that is to say:

I claim the mode of straightening splits, or dents, for weavers' reeds, by the united aid of heat, moisture, and pressure, between flat plates.

JACOB SENNEFF.

Specification of a Patent for an improvement in the preparing of Clay for making Brick. Granted to JARED G. TALCOTT, *Glastonbury, Hartford County, Connecticut, October* 1, 1830.

THE machine for preparing clay for making brick, is a cylindrical tub open at the top, fixed on a firm platform, with a perpendicular shaft passing through the centre, resting in a socket on a supporter beneath the platform; having a sweep attached to the head of it, for the purpose of causing it to revolve by horses, or other power.

The tub is filled about two-thirds of its depth from the bottom up, with square bars of iron, about four inches apart, passing from side to side, and secured, with the angles of the squares vertical and horizontal, intersecting each other with a small angle, and leaving room in the centre for the shaft. The main body of the shaft is an eight square timber, through every square of which are driven bars of square iron about four inches apart, and in length nearly the diameter of the tub. These are drawn out into horizontal knives, gradually commencing about one-third the distance from the shaft, to the extremity; and these knives are so disposed as to pass through in the revolutions of the shaft, every intermediate space of the horizontal bars in the tub, or cylinder.

By the means of successive revolutions of the shaft with the knives, the mixture of sand and clay, or clay alone, is perfectly prepared, when it reaches the bottom of the tub, where it passes off fit for moulding, through an aperture, into a platform, where the striker stands to perform his labour without any removal of the preparation.

The improvement claimed in the machine is, the placing the bars and knives in such a position as to clear it from all obstructions of roots, grass, and other substances incidental to clay, without stopping its operation, merely by reversing its motion, which effectually prevents delay, and is a great saving of labour, as well as preparing the clay better with less expense than any machine hitherto used.

JARED G. TALCOTT.

Specification of a patent for a Self-adjusting Rail-road and Street Car, with Guide Rails adapted to the same. Granted to JOHN POLLOCK, *of Hopewell, Lower Oxford, Chester county, Pennsylvania, October* 1, 1830.

To all to whom these presents shall come, be it known, that I, John Pollock, of Hopewell, Chester county, Pennsylvania, have invented new and useful improvements in the rail-road and street-car, with guide rails adapted to the same. This car I denominate the self-adjusting rail-road and street car, as it is designed to adjust itself to all the ordinary purposes of transportation, on either rail-roads, common roads, or streets, or to turn out from one rail to another, as necessity may require, which objects I effect by the guiding apparatus attached to the fore axle, or bolster of the car, and by placing at the intersection of common, or termination of rail-roads, a simple system of guide rails, which acting simultaneously on the guiding apparatus, attached as aforesaid, enables the car, on leaving the rails, to adjust itself to the common road, or street; or, on leaving the common road, or street, to adjust itself to the rail-road, or turn out, from one rail to another.

Also by a new mode of coupling, the wheels are made to track, or follow each other, in either a straight, or curvilinear direction. By the combined agency of the guiding apparatus and coupling, the use of flanches is avoided. And that the following is a full and exact description of the same, reference being had to the drawings which accompany this specification, and which make part thereof. The bed and wheels may be of the general construction in ordinary use, except that in the mode of guiding and coupling the cars, which I use, (as before observed,) the use of flanches on the common wheels is dispensed with. The peripheries of the wheels are made broad to admit of casual deviations in their motions, or accidental variations in the width of the rails. The axles on which the wheels revolve are made of iron, and fastened under the lower bolsters which support the bed. In the centre of the hind bolster is a hole in which is a bolt, with a head, or shoulder, on which the bed rests. In the centre of the fore bolster is a similar hole with another bolt, or pin, which supports the fore part of the bed. On this bolt is a large broad head, in which are two grooves, or openings, at right angles to each other. The groove parallel with the bolster is to give play, or rocking motion to the bed. The other groove which is parallel with the bed, is to admit a horizontal pin which is made fast to the bed, and acts as a pivot on which it may rock (as above alluded to,) when the wheels are passing over unequal planes. The coupling which I use, may be applied either to a single pair of axles, as for one car,) or an indefinite number, when many cars are designed to be attached together. It is formed by two rods placed obliquely, and crossing each other in the centre. These rods are connected to the axles or bolsters, at or near the same, by a joint or pivot on which

they turn freely. The rods form tangents or circles, the bolts which support the bed being the centre of the circles. The same radius is used at each end of the coupling, and should be equal to about one-fourth of the length of the axles, inside of, or between the wheels. The joints or pivots being placed at the intersections of the radii and tangents.

The rails on which the car is to run may be either of wood or iron, of the common construction, and modes of fixtures, except the guide rails which will be hereafter described. The self-adjusting apparatus for bearing against the sides of the rails, is constructed as follows. There are two levers, or fender rails, (equal in length to about half of the distance between the two main axles,) connected to the fore axle, or bolster, near the wheels, by two short projecting pieces, forming pivots for them to work on. The other ends of them project forward, their line of direction forming an angle more or less acute with the plane of the road, on which the car is to travel. They may be connected firmly by cross bars, or braces, or in any other way by which they will have advantage to traverse the axle under the bed, thereby adapting the periphery of the fore wheels to the inclination of the rails. The outer ends of these fender rails, (or guide levers,) are fended from the rails by the interposition of wheels, for the purpose of reducing the friction. These wheels are retained in a horizontal position, as near as possible, (when elevated or depressed,) by attaching them by their axles to the lower ends of upright slings. These slings have in their upper ends an opening, or slit, to admit of their moving up and down on pins, which are attached to the ends of suspending gallows that are made fast to the axle or bolster. The lower ends of the slings are connected to the fender rails by a small axle, or rod, passing through them, on which they have liberty to work. This axle also has two small wheels on it for the purpose of reducing the friction when rolling on the inclined planes of the guide rail, thereby raising or lowering the adjusting apparatus. To secure the adjusting apparatus, either up or down, there are two dogs formed on the principles of the hammer lever; the angles, or fulcrums of which, are connected to the fender rails on one side, by a pivot, on which they work, at a distance from the outer ends of the fender rails, equal to about one-third of their whole length. One end of each hammer lever extends upwards, with a projecting knob on it, for the purpose of catching and holding against the edge of a mortise, or pin, in the suspending arm, or gallows. The other ends of these levers project forward along side of the fender rails, for the purpose of being elevated by the guide rails, or being depressed by their own gravity. The outer extremity of the whole self-adjusting apparatus, as above described, is suspended and retained in its proper position by the bed, on which is a small piece projecting downwards with a slit to receive a slider, which is made fast on the gallows, thereby allowing the lateral movement of the adjusting apparatus; or the same purpose may be effected by a similar contrivance of a slider and gallows on the opposite side of

the fore axle in connexion with the bed, or coupling rods. It will be seen from the above arrangement, that any lateral effect produced on the outer extremity of the self-adjusting apparatus will cause the fore axle to traverse on its centre bolt under the bed, and from thence the motion is communicated by the coupling rods to the hind axle, causing it to move on similar lines and angles to those described by the fore axle. The guide rails, (to answer the purpose before alluded to,) are placed parallel with, and between, the common rails, on a platform which is in the same plane with the common rails. The ends of the guide rails next the intersection of common roads, or streets, are curved, and may meet. Their upper sides are parallel to the plane of the platform or road on which they are laid. The other ends form inclined planes on their upper sides, which inclinations extend about half of their lengths, and terminate in an elevation a little above the horizontal ends. There is also a projecting lip or edge extending along on the outside of the inclination in the same with it, as far as the highest part where the inclination of the lip or edge is reversed.

The simultaneous movements of the self-adjusting apparatus, when it is passing off from the rail-road, are accomplished in the following order:—The upper ends of the dogs are released from their hold, on the under side of the gallows, by their lower ends ascending the projecting lip or edge of the guide rail, at the same time the fender, levers, and wheels are elevated by the inclined plane to their summit, and suspended by the upper ends of the dogs catching on the upper sides of the gallows, as the lower ends descend the reversed inclination on the summit of the lip, or projecting edge of the guide rail. When the car is returning to the rail-road, the fender wheels come first in contact with the horizontal ends of the guide rails, which direct the car on to the rails again, when, by the simultaneous agency of the adjusting apparatus, the fenders are depressed to their former position, by the same causes which effected their elevation. What I claim as new, and my invention or discovery, in the foregoing discovery, is, first, the self-adjusting or guiding apparatus attached to the fore axle of the car, by which it is made to answer the several purposes hereinbefore described. Second, the tangent coupling or connecting rods, as before described. Third, the guide rails placed at the intersections, terminations, &c. of rail-roads, to answer the purposes hereinbefore described.

I wish it to be understood that I do not claim the exclusive privilege of using guide wheels, neither of shifting them, but only their use in connexion with my self-adjusting apparatus as connected with the car. I do not deem guide wheels to be necessary for the hind wheels of my car; but, if required, they may be made to operate upon the same principle as those of the fore wheels.

JOHN POLLOCK.

Description of the Drawings.—Fig. 1, Plate XVIII. represents a top view of the carriage.

a a, the bolsters and axles. *b b*, the centre bolts. *c c*, the coupling rods. *d d*, wheels. *e e*, the gallows or arms. *f f*, pins for the slings to move on. *g*, the slider. *h*, mortise or slits in the slider.

Fig. 2, Plate XVIII. exhibits a side view of part of one of the front wheels, and of the principal adjusting parts.

The same letters refer to the same parts in both the figures.

i, fender rails. *j*, the upper end of the dog. *k*, its lower end. *l*, sling attached to the fender rails. *m*, fender wheels. *n*, bed sill. *p*, road rails. *q*, projecting pieces forming pivots to the fender rails.

Fig. 3, Plate XVIII. shews the fore wheels of the carriage, and the guide rail in periphery.

Specification of a patent for an improvement in the art of manufacturing Malleable Iron from Pig Metal. Granted to THOMAS COTTON LEWIS, *Pine Creek, Alleghany county, Pennsylvania, October* 1, 1830.

I DO hereby declare that, according to the best of my knowledge and belief, I am the original and sole inventor of an improvement in the manufacture of malleable iron by means of a reverbatory furnace for melting and refining the pig metal, without the aid of bellows, or the necessity of coaking the mineral coal. Hitherto, the pig metal has been refined by means of a blast run out refinery, heated by mineral coal coak, or the char of wood; and in consequence of the pig metal being laid, (stratum super stratum,) upon the coak, they melt down together, and the impurities of the coak must, more or less, incorporate with the metal while in a state of fusion. The method I have adopted, will obviate those evils, as well as be a considerable saving to the manufacturer.

A reverberatory furnace is first provided, fifteen feet long in the clear, by four feet wide; the grate, or fire-place, is three feet long, by four feet wide; the body of the furnace is nine feet long by four feet wide; the neck of the furnace leading into the stack is eighteen inches long; the bottom of the stack, or flue, is eighteen inches square, making the whole inside length fifteen feet; over the flue stands the stack, which is thirty-five feet high by eighteen inches square in the clear. On the side, or front of the furnace, and centre of the grate, stands the stock hole of nine inches square, for introducing the mineral coal into the grate. Upon the same side, or front, and the middle of the nine feet length, is a door for introducing the pig metal, which door way is twenty-two inches wide by eighteen inches high. A door of cast metal is made to shut up said door way, as soon as the metal is introduced, that as little air as possible may be introduced into the furnace. In the centre of the door, and at the lower edge, is an opening of five inches high by three inches wide, for the purpose of agitating the metal while in a

state of fusion; while the metal is melting, said hole, or opening is stopped up by a brick, or piece of cast metal, made to fit such opening. In the body of the furnace, opposite the door way, is the basin for receiving the melting metal, which is ten inches deep below the door way, or fore plate. Said basin is two and a half feet diameter at the bottom, to slope gradually from the upper part or face of the bottom. Said bottom is made of coarse sand of the silecious kind, and the clearer such sand is of alumine, or calcareous matter, the better it will endure the heat of smelting. When the furnace is sufficiently heated for melting, ¾ to one bushel of charcoal is to be introduced into the basin through the door way; after which, one bushel of forge, or hammer cinder, previously made, which cinder is to cover the charcoal previously introduced. After which, eighteen or twenty hundred weight of pig metal is introduced, which is carefully to be laid round the basin, leaving spaces, if possible, between all the pigs, for the action of the flame to facilitate smelting. As soon as the charge of metal is introduced, fresh coals are to be thrown into the grate, the fire well stirred up, and the stock hole closed with small coal, to prevent any current of air introducing itself that way; in fact, no air ought to be let in if it can be prevented, otherwise than through the fire from below the grate. The fire being well kept up for the space of an hour, the metal will have nearly melted; as soon as the workman perceives that to be the case, it will be necessary for him to introduce an iron rabble into the furnace through the opening in the door, and draw the whole of the metal from the sides, into the basin; then introduce ¾ to 1 bushel of charcoal upon the face of the metal in fusion. The fire must be kept up as strong as possible, and the metal frequently agitated with an iron bar or rabble. In half an hour after the whole is melted down, it will be sufficiently decarbonized to let it run out through the tapping hole which is upon a level with the bottom, or ten inches below the fore plate, or door sill. Cast metal boxes are prepared, about 3½ inches deep, 20 inches wide, and 10 or 12 feet long, and placed below the trapping hole, to receive the metal; in half an hour such refined metal will be ready to take out of the box, and hauled out of the way.

Much depends upon the skilfulness of the refiner, in depriving the metal of its carbon, and, at the same time, to prevent too great an oxidation from taking place. If the metal is sufficiently fluxed, the texture will be clear, and more or less branching like the fibre of an oak leaf; with from ¼ of an inch to an inch of honey-comb appearance upon the upper surface.

A furnace upon the above construction, if properly attended to will refine 3½ to 4 tons, in twelve hours, and consume 15 to 18 bushels of mineral coal to each ton, two bushels of the char of wood, and 22 cwt. of pig metal to each ton of refined metal. The advantages of refining after the above method, will appear obvious to every discerning mind, as the metal is not brought into contact while in a state of fusion, with any part of the mineral coal.

From the intense heat of the furnace, the volatile parts of the coal

are consumed, or pass along the roof of the furnace into the flue, while the surface of the metal is protected by the charcoal and the scoria, which in all cases keep uppermost without incorporating with the metal. Refining after the above way will be of great advantage to forges which bloom by means of charcoal, as it will greatly facilitate the procedure and lessen the quantity of charcoal used. The iron made as above is quite malleable, close in texture, and fibrous. One great acquisition is, that said refining furnace requires no machinery attached to it, and may be erected out of the way of all other buildings. THOMAS C. LEWIS.

Specification of a patent for a Labour-Saving Tanning Apparatus. Granted to WILLIAM BROWN. *City of New York, November*, 11, 1830.

THE improvement herein claimed by the subscriber, is the connecting and concentrating of the various processes through which the hides pass before they become leather, by means of suitable machinery, into one apparatus, the construction of which is as follows.

There are four, or more, leatches, or cisterns, for infusing the bark, which are placed contiguous to the handlers, or vats, on the same level, but projecting at the top above them. These leatches, or cisterns, communicate with each other by means of tubes, inserted between them near the tops, and are supplied with false bottoms, which fit loosely, and which are perforated with holes, forming a kind of strainer. In each of the leatches is fixed an aqueduct or tube, which is used to convey the liquor from the bottom to the communicating tubes. By this contrivance the liquor is passed from the bottom of one leatch, into the top of the adjoining one, where it acquires a fresh portion of strength, and is thus propelled through the whole series, by pouring the water or weak liquor into the tops of the leatches, until it being of sufficient strength, arrives at the fourth or strongest leatch. There is also placed in one corner of each of these leatches, what is called an eye, which consists of a trunk projecting below the bottom of the leatch, and connected to a horizontal pipe, which serves to convey the liquor, when of sufficient strength, directly to the handlers, or vats; this trunk is supplied with a plug for regulating the quantity of liquor thus drawn off.

At a convenient distance from the leatches, and on the same level with them, is placed a heater, which consists of two or more horizontal copper, or iron, pipes, which are placed one above the other, and have connecting tubes near their ends. These pipes are attached to and communicate with another, of a square form, in which the fire is made. These pipes, or heaters, are secured within a cistern, with their ends projecting at one side, and have caps for the convenience of cleaning.

It will be seen that when a fire is kindled in the lower heater or

box, the heat passes from it into the tube above at its farthest extremity, and comes forward and enters the next above, and so goes backward and forward until it enters the chimney at the opposite side, thus transmitting all the heat of the fire, to the liquor with which the cistern is constantly filled. There is a tube communicating with the heating cistern for supplying it with weak liquor or water, and communicates at its opposite extremity with a trunk or reservoir, which is furnished with a pump, by which the liquor is raised to the tube and forced into the heating cistern, which is kept constantly full by this means; the heated liquor passing off at a different tube, which communicates directly with the leatches. The leatches are filled with bark by means of a conveying trough communicating with the elevators of the mill.

The strong liquor or infusion passes from the bottom of the leatches as before mentioned, into a trunk passing into a horizontal position under them, and rises by a vertical tube inserted in said trunk, from which it is transmitted to another horizontal trunk communicating with the handlers, or vats, and passing along their upper surfaces. By this method the liquor from the leatches is transmitted into the tops of the handlers, or vats. At the bottom of the vertical tube, and within the lower horizontal trunk, is placed a valve moveable by means of a strap extending up through the said tube. This valve is to prevent the stronger liquor from entering the reservoir, and thus mixing with the weaker.

The liquor after having passed through the handlers, or vats, is drawn from their tops by means of a hollow plug inserted into the lower trunk before mentioned, and runs into the trunk or cistern, from whence it is again transmitted to the heaters, and so on to the leatches; so that the same liquor is continually in use; the evaporation and waste of which is supplied by water.

In each of the handlers is a real, or cylinder, formed by two circular heads secured at the required distance apart by longitudinal bars; and having gudgeons which work in slides, for the convenience of elevating or depressing them at pleasure. The hides are secured on the inside of the reels by means of hoops, which encircle the reels a short distance from their heads, and have pins on their outer surfaces by which the hides are fastened; or they may be thrown loose into the reels.

The great saving of labour in this invention consists in the facility with which the hides may be kept in motion when immersed in the liquor. Each of the reels has a rag wheel attached to it, and is turned one notch at a time, by means of a shaft which is geared into a click, to be worked by hand, or may be moved by animal, water, or steam power. The piston of the pump in the trunk or reservoir, is attached to one of the shafts, and may be moved or unshipped at pleasure.

There is what is called a beam house connected with this apparatus, where the hides are first limed before they are put on the reels. The water which is necessary to mix the lime, is heated and supplied on the same principle as before mentioned for the leatches;

and the piston of the pump attaches in a similar manner to the shaft. In laying away hides, it is necessary to have the ground bark which is put between them, moistened or damp, to prevent waste and dust. The contrivance for this purpose consists of a small cistern, elevated at a convenient height, and supplied with a spout perforated with holes, and a cock for regulating the quantity of water required to wet the bark, which is placed under it. The subscriber claims the privilege of using his improved labour-saving tanning apparatus, on as large or small a scale as he may require, and with any number of leatches and handlers. WM. BROWN.

Specification of a Patent for Improvements in the apparatus for Boring the Earth for Water. Granted to LEVI DISBOW, *City of New York, November* 2, 1830.

MR. DISBROW has a former patent for boring apparatus. One particular object in the present patent, appears to be the employment of bits with springs attached to them, to cause them to bore a hole larger than that of the tube through which they are passed down. The parts described are as follows;—

No. 1. *The pipes for sinking in the earth*, are of cast iron, of an equal bore throughout, but of a diminished thickness, taken from the outside near the end, till it is small enough to fit into the socket formed on the next length of pipe—the socket is formed by a band of wrought iron, placed on the end of the pipe, but which, when cold, contracts, and so remains permanent. The next length of pipe is formed in the same manner, and so may be continued to any required length or depth. The joints are closed as iron joints, by driving wedges, and so resist either water or steam.

No. 2. *The pod or cylinder bit for boring the earth*, passes through the pipe. It is made of iron, pointed with steel; there is a spring on the outside whose most disengaged state is larger than the outside of the pipe, to the end that when it gets below the pipe, it may cause a hole to be bored larger than the pipe to be received; and which is effected by the distension caused by the spring.

No. 3. *The chain and levers for forcing down the pipe.* The levers are two pieces of joist made fast to the platform by pieces of chains, or other common means. The chains have hooks on either end. One hook fastens on the socket; the other is passed with the chain round the lever, and hooks in such part of the chain, as the purchase may require, at pleasure.

No. 4. *Rods connected by crutch joints and screws.* The rods are square lengths of iron; there is a square crutch formed at each end of the length, into which one admits the other. The ends are held by screws which pass each other transversely; by

this means any length of rod may be securely connected, gaining the effect both of flexibility and strength.

No. 5. *The spring chisel* is formed by a spring which confines the operation of the chisel, or punch, to the edge of the pipe. Its use is for breaking off pieces of stone which in part obstruct the passage of the pipe,

No. 6. The rock boring tools are, first, a set of chisels, or punches; second, a riming bit. It is formed by four dies of steel well bolted on a square rod, which extends below as a guide; its use is to enlarge a hole already made to any proposed size. The whole of the above tools and apparatus are used with the machine already patented to said Levi Disbrow, dated twenty-fourth March, one thousand eight hundred and twenty-five.

LEVI DISBROW.

MISCELLANEOUS.

DESTRUCTION OF WEEDS IN PAVED PATHS AND COURTS.—The growth of weeds between the stones of a pavement is often very injurious as well as unsightly. The following method is adopted at the Mint at Paris and elsewhere with good effect. One hundred pounds of water, twenty pounds of quick lime, and two pounds of flowers of sulphur, are to be boiled in an iron vessel; the liquor is allowed to settle, the clear part drawn off, and being more or less diluted, according to circumstances, is to be used for watering the alleys and pavements. The weeds will not appear for several years.—*Recueil Indust.*

NEW PYROPHORUS.—Dr. Hare recommends as a new pyrophorus, Prussian blue heated to redness, for about a minute, in a glass tube, and then sealed up hermetically. As soon as the tube is fractured and the contents thrown out upon a table, they take fire.—*Lilliman's Jour.*

BENGAL TIGER FOUND IN SIBERIA.—Ehrenberg during his journey through Siberia, made a discovery of great interest for the geography of animals, and in some respects for the history of fossil bones, viz. the existence of the great tiger of Bengal in Northern Asia, between the latitudes of Paris and Berlin. He also describes a great panther, with long hair (Felis irbis), he met with in the Altain chain of mountains.

MAGNETIC REACTION OF PLATINA.—In a piece of Russia platina the size of a walnut, Gobel detected the two magnetic poles. Its magnetism was so powerful that a middle-sized needle was attracted by it, and a magnetic needle was, at a certain distance, set in motion by it. Many similar pieces of platina, from the size of a hazel nut to that of a hen's egg, in the collection of the Imperial Mining Academy of St. Petersburg, exhibit similar properties.

SUBMARINE FOREST, NEAR CULLEN.—Mr. Christie, of Banff, informs us that a submarine forest exists at the mouth of the burn of Cullen, and along the bay about that point; but as it can only be reached at the lowest tides, it has not yet been fully examined. It is said to contain oak trees in an erect posture, rising from a bed of blue clay. We hope to hear more regarding this interesting statement.

LIST OF NEW PATENTS SEALED.

SPINNING.—To J. Bates, of Bishopsgate Street, gentleman, for improvements in machinery for roving, twisting, or spinning cotton, silk, wool, hemp, flax, oro ther fibrous substances. Communicated to him by a foreigner residing abroad.—Dated October 27, 1831.—Specification to be enrolled in six months.

UPHOLSTERY.—To Sarah Guppy, of Tarway-house, Clifton, near Bristol, widow, for a method of applying and arranging certain articles, parts, or pieces of cabinet work, upholstery, and other articles, frequently applied to bedsteads, and hangings, and also others not hitherto so applied. October 27, 1831.—Two months.

BRIDGES.—To J. Macdonald, of the University Club-House, Pall Mall East, gentleman, for an improvement in the construction of bridges made of iron or other materials, and are also applicable to the construction of piers, rail roads, &c. Communicated to him by a foreigner.—October 31, 1830.—Six months.

FASTENINGS.—To G. Minter, of Princes Street, Soho, cabinet-maker and upholsterer, for a fastening for dining tables, and other purposes.—Nov. 9, 1831.—Two months.

STEAM.—To T. Brunton, of Park Square, Regent's Park, for a new application of apparatus for heating fluids or liquids, and generating steam.—Nov. 15, 1831.—Six months.

WATER.—To T. Brunton, of Park Square, Regent's Park, Esq. and T. J. Fuller, civil engineer, for an improvement on mechanical apparatus applicable to the raising of water, and other purposes.—Nov. 15, 1831.—Six months.

RUDDERS.—To A. H. Holdsworth, of Dartmouth, for improvements in the construction of rudders. and in the application of the same to certain descriptions of vessels.—Nov. 19, 1831.—Six months.

CARDING.—To D. Selden, of Liverpool, merchant, for an improved carding and slubbing engine for wool and other fibrous substances.—Nov. 22, 1831.—Six months.

TO OUR READERS AND CORRESPONDENTS.

MR. L. G—— is informed, that the Boiler he suggests has been in use these fifty years past, and is chiefly objectionable on account of consuming too large a quantity of fuel.

A. B. and Mr. L's favors are received.

ERRATA IN OUR LEST NUMBER.

In a description of a wheel which forms its own railway, page 248, line 35, for "*scrapers*" read *scapers*—and at p. 249, instead of "*prevent*," read *present*.

PATENTS ENROLLED BETWEEN 10TH NOVEMBER, AND 10TH DECEMBER, 1831.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

DISTILLATION—To Andrew Ure, of Finsbury Circus, in the county of Middlesex, a patent for "an improved apparatus for distillation," was granted on the 31st of March, and the specification was deposited in the Enrolment Office, on the 30th of September, 1831.

In this apparatus the wine, wash, or other fermented liquor during its passage into the alembic or still, is extensively exposed in a very thin stream or stratum on a series of shelves or trays slightly inclining one over another to the hot vapours ascending from the still. By this exposure to the cool wash, the temperature of the vapour is partly moderated towards the degree most favourable for the production of a fine spirit, and the wash itself is at the same time partially deprived of its finer alcoholic particles by a steam distillation, before it reaches the alembic.

The physical principles on which the apparatus is intended to act, the patentee states to be as follows :—

Fermented liquor contains three ingredients, all volatile by heat, but at different successive degrees of temperature, viz. alcohol, essential oil, and water. If a mixture of these three substances in the vaporous state be passed upwards through tortuous tubes or channels, maintained by any means, at a temperature under 160° Fahrenheit, alcohol vapour alone in any considerable quantity will retain its tension, or continue to exist, so as to pass onwards into the refrigeratory :—if the said channels acquire a temperature of 180° Fahrenheit, some essential oil and steam will accompany the alcohol vapour, and pass onwards with it; and if the channels acquire the temperature of 212° Fahrenheit, the said three volatile matters will all pass freely into the condenser, so as to constitute a spirituous liquor, more or less crude according to the crudity of the fermented matter. Now, it is proposed by the said exposure of the cool wine or wash, on its ample series of surfaces, in the progress of its descent into the alembic, to refrigerate the mixed vapours as much as possible, both by the heating and the evaporating of the wine or wash; and to supply whatever additional refrigeration may be desired by the application of water, at a regulated temperature, to the metallic vessel or cases which contain the shelves or trays before-mentioned.

In the drawings which accompany the specification two different modifications of the system of moveable shelves or channels are delineated; the first, we shall describe with reference to the drawing marked fig. 1, Pl. XIX.

In this figure A A represent the section of an exterior cylindric annular space contained between two metallic cylinders; and B B represent the section of an interior annular space. Each of these spaces is furnished with a series of annular shelves or channels standing over one another at a distance of one inch or more; each of which is perforated with a slit or holes at one spot, for the descent of the thin steam of wash into the subjacent shelf. Across the upper surface of each annular shelf or tray, a vertical ridge is fixed to one side of the slit or holes, so that the liquor being delivered always on the side of the ridge opposite to the said slit or holes, must perform a complete revolution on the shelf before it can descend into the next shelf, and so on in succession.

These annular shelves have their edges turned up, as shown in the section, which prevents the liquor escaping over their edges while it stiffens the flat metallic ring. The system of shelves for one annular cylindric space may be conveniently connected by three or four rods passing down through them, so as to bolt or solder them together, and to permit them to be drawn up easily in one body, for the purpose of cleansing or adjusting at any time. The fermented liquor is admitted in a regulated stream into the top shelves through the stop cock C, of which the key may be mounted with a graduated arch; or the pipe between the stop cock and the ball *d*, may be a graduated glass tube, the height of the liquid column in which, will determine the rate of efflux through the two orifices below, which are of different widths, but together much smaller in area than the waterway of the above stop cock. The top of each cylindric annular space is covered in by an annular plate, which is secured with bolts and packing in the usual way. The bottom of each annular space is also closed either by a special annular plate, or by a circular plate including both spaces. The pipe E represents the back of the alembic, which rising with a gentle slope, enters the bottom of each of the cylindric annular spaces at *f f*, whence it diffuses the vapours freely all around, and upward among the moveable system of annular shelves.

The rectifying cylinder, fig. 1, and its shelves, may be advantageously made of tinned copper, or of laminæ of tin, hardened with a copper alloy; but it is desirable to pass the

spirituous vapour, at last, up through one spiral coil of tin plate, as shown at *g g*, immediately before its entrance into the refrigeratory worm in *h*. The tub or back *i i*, is filled with water, which bathes the outside of the rectifying cylinder as well as the interstices between the concentric cylinders. As this water tends, in the progress of distillation, to become too hot, especially when a strong alcohol is sought for, its temperature is regulated by the application of a suitable modification of the *thermostat*, or heat governor, invented by Dr. Ure, which was the subject of a distinct patent, and is described at page 69 of this volume: the expansion of the ends of the compound metallic bars of this instrument act on the stop cock *c* of a cold water cistern, so that whenever the temperature of the surface water of the bath in which the said bars are plunged, exceeds the defined degree, a stream of cold water is admitted into the body of the bath through the pipe *d d*, so as to chill it, and to cause the hot water to pass off through the overflow pipe *e*.

Another modification of the principle of the moveable system of shelves and channels, is described in the specification; and although it is decidedly the best arrangement of the two, we must omit the drawing for want of space: it may, however, be easily comprehended without a drawing, when the first described arrangement is understood.

In this second plan, the series of shelves or trays are rectangular, and are contained in cases representing hollow parallelopipedons, of which the width is small compared with the height. The cases are open at top and bottom, where they are soldered into a general cavity, enclosed by covers, and secured in the usual way. Each case is furnished with a vertical series of oblong shallow trays, the edges of which are turned up at three of their sides, one of the ends being left open for the discharge of the wine into the subjacent shelf or tray; to facilitate which operation each tray is slightly inclined from the horizontal position, in opposite directions. Each series of shelves is so framed together by vertical rods as to admit of its being easily lifted out of its compartment and cleaned. Between the shelf cases, there are cellular intervals, that allow of a free circulation of the water contained in the bath cistern, in which the cases are immersed; and the temperature of the bath is regulated by one of the patentee's thermostats, by being connected with the stop cock of a cold water bath. The wash descending from above enters a horizontal pipe, furnished with jets, which distributes the liquid equally to the several series of trays.

The shelf case is three inches wide, for an ample exposure of the wash while the water cell between the cases is only one inch; this body of water having been found by the patentee to be fully sufficient to control the temperature of that body of vapours.

Instead of applying naked fire to the alembic, in some cases, the patentee proposes to immerse it in a bath of muriate of lime, contained in a suitable pan, and regulated by his thermostat. In other cases he plants on the bottom of a round alembic, an upright metallic laminæ, twelve inches, more or less high, and of such a length that it may form an helix, like the main spring of a watch, extending with numerous coils from the centre to the circumference; or the alembic being rectangular or oblong, of any shape, the said metallic laminæ or riband may be planted upright, in a zig-zag direction, from one end of the alembic to the other. The object of these open winding channels, is to enable the wash already stripped in a great measure of its spirit by the steam distillation in the rectifier vessel, to throw off the remainder of its alcohol, in its tortuous journey of ebullition over the bottom of the alembic. A syphon pipe, furnished with a swivel stop-cock, regulates the depth of liquor on the bottom of the still, and the level of discharge.

Should any appreciable spirit be found in the discharged or spent wash, the rate of influx of the fresh wash into the shelf cases may be moderated. When this continuous plan of distillation by a perpetual ingress and egress of the wash, till the whole be worked off, is not adopted, the patentee recommends the distiller to use his apparatus in the following way:—

Let him introduce into the alembic just enough of his fermented liquor to protect the copper from injury by the fire, reserving the main body of the liquor in the charging back; so soon as the ebullition in the alembic has raised the temperature of the rectifying bath to the desired pitch, let him open the communication with the charging back, turning the index of the graduated stop-cock so as to admit the wash in a regulated stream. Towards the end of the operation, after all the wash has run into the still, he may for the sake of dispatch, permit the rectifying bath to take a higher temperature, and draw off the cruder and weaker spirits into a separate cistern, from which they may be pumped into the still, as the starting or preparatory liquor of a second charge.

For the *rectifying* of spirits the apparatus may be worked in the

same way; that is, some weaker spirits being introduced into the still to generate steam, and heat the shelf apparatus, the relatively stronger spirits in the charging back may then be admitted in a regulated stream while the thermostatic apparatus is so adjusted as to maintain a proper temperature in the water bath rectifier. The foregoing plan of water bath, combined with the thermostatic apparatus, may also be used simply as a rectifying cistern, without transmitting the spirit or wash through it, since the series of shelves will cause the vapours from the still to impinge against a most extensive system of metallic surfaces, maintained at a regulated temperature, whereby their watery and crude constituents will be condensed and precipitated, while their finer alcoholic particles will proceed forward to the refrigeratory.

The patentee suggests the employment of a similar series of shelves and compartments to be immersed in the worm tub, as an elegant substitute for the serpentine tube. In that case, it is recommended that the cases be made of laminated tin, hardened with a little copper alloy; and they should be narrower compared to the water cells; such a condenser permitting its interior passages to be readily inspected and cleansed.

The claims to invention consist, *first*, in the foregoing applications of a horizontal or inclined moveable system of shelves, trays, channels, or gutters, either straight or curved, and enclosed in metallic cases, separated by water, for the purpose of exposing on an ample surface, during their descent into the alembic, fermented or alcoholic liquors to the action of the hot vapours rising from that alembic; *second*, in the combination of the moveable system of shelf cases, with the thermostatic apparatus for regulating the temperature of the water bath, in which the cases are immersed; *third*, in the application of the moveable system of shelf compartments, to the purpose of a condensing refrigeratory for converting the alcoholic vapours into a cool liquid; *fourth*, the application of a muriate of lime bath, regulated by the thermostat, to the heating of the alembic, whereby empyreuma in the distillation of wash from malt, grains, &c. may be prevented.

Cocks or Taps.—To Robert Burton Cooper, of Battersea Fields, Surrey, Esq., a patent for "an improvement or improvements in a cock or tap, applicable to fluids, liquids, and gases; and for applying the said improvement or improvements to other useful purposes," was granted on the 18th of May, and the

specification was lodged in the Enrolment Office on the 17th of November, 1831.

The substitution of a spherical for a conical plug is the improvement contemplated by this patentee; so that it may accurately fit a hollow spherical receptacle to whatever position it may be turned.

The cock is made of sufficient magnitude, that the way through the spherical plug may be equal in capacity to the pipe or other passage on which it is applied; and the body of the cock must be made in two pieces, and secured together, after the plug has been introduced, by means of a flanch on each end and a series of screws. Through the shell or body proceeds from the plug, a stem, which is provided with a squared end for the reception of a key or a cross head, according to the magnitude of the cock, for the purpose of opening and closing it. When the cock is large, it is proposed to make the plug a half, or any other convenient portion of a sphere, not less than a half, then the extent of surface in contact, and consequently the friction may be diminished. In this case, the stem by which the plug is turned is made to project, in a direction so as to make an angle of about forty-five degrees, with the pipe in the direction of the fluid passing through.

Another modification is described to consist of a hollow hemispherical shell, with a flat top screwed upon it, for the reception of a hemispherical plug, which is also made hollow, with an opening through the stem for the admission of atmospherical air, for the purpose of rendering uniform and simultaneous the changes of temperature in the exterior and interior parts of the apparatus, that the plug may not be set fast by a greater expansion arising from a superior degree of temperature, or rendered leaky by a diminished magnitude, consequent on an inferior degree of heat.

This latter form is recommended, as applicable to large pipes such as those laid down in the streets for the conveyance of water or gas for the supply of towns.

The application of the spherical form to the stoppers of glass and earthenware bottles, to ink-stands, &c. is next described at considerable length, and illustrated by a variety of drawings annexed to the specification, which may be easily conceived; but it must be observed, that in all these cases it becomes necessary either to keep down the stopper to its seat by means of a screwed top, or else by causing friction between the neck of the bottle and the stopper above the spherical parts which fits into a corresponding spherical seat.

PENS AND PEN-HOLDERS.—To Sampson Mordan, of Castle Street East, Finsbury, in the county of Middlesex, Engineer, and William Brockeden, of Devonshire Street, Queen Square, in the same county, Esq., a patent for "certain improvements in the construction of writing-pens and pen-holders, and in the method of using them," was granted on the 20th of September, 1831, and the specification was enrolled in the Enrolment Office on the 19th of November, 1831.

There are, we conceive, but few persons who have failed to observe, that in writing the common hand, the right-hand nib of the pen wears away first. Now, this effect is evidently produced by the pen being held in an inclined position in a reverse direction to that of the inclination of the letters in the writing, causing one nib to bear hardly upon the paper, while the other touches it but lightly; and this unequal bearing frequently causes the nibs to divide in the upstrokes of the pen, and produce thick or blotted writing.

It was probably with the view of obviating these effects that the writers and clerks of olden time wrote with their letters either upright, or inclining to the left hand, both of which modes are still retained by "*the* legal profession." Making due allowance for the obsoleteness of many of the characters, we think it must be allowed that such writings possess more clearness and intelligibility of form than our modernized writing; and that if the lawyers have been taught their backward mode of writing (as some persons have hinted) by the "old gentleman," who is represented prompting them in some other matters, we must do him the justice of inferring that it was with the friendly view of saving their pens. It is, however, satisfactory to observe, that by the assistance of the ingenious patentees, *the* profession will be enabled to change their writing master, and incline themselves to that which is right and straight forward, albeit that the means to do so are by certain crooked instruments, which we will proceed to describe.

The said instruments are, either *pens* (formed of quills, steel, or other materials), *with inclined slits*, that is, not longitudinal or parallel with the shaft of the pen as usual, or *pen-holders* so crooked or inclined, as to hold a pen of the usual cut in a line corresponding with the inclination of the letters of the writing.

A great variety of modifications of such instruments is set forth in the patentees' specification, and explained by twenty-nine figures. In the first place are shown quill-pens, and *portable* pens (the latter name implying short pieces) having inclined

slits, and metal pens similarly formed; these are put into straight handles, and are fastened by any convenient means, such as shells, rings, loops, &c., that clip and bind the parts together.

To apply the principle of the invention to pens cut in the usual manner with straight or longitudinal slits, handles are provided, which have at their lower ends curved metal arms with clips or holders, which fix the pens at an angle, diverging from thirty to forty degrees out of the right line formed by the handle; and some of these pen-holders are furnished with joints and set-screws to enable the writer to place the pens at such an inclination with respect to the handle as will accord with the inclined position of the letters he is making.

At fig. 2, Pl. XIX., we have sketched one of the said pen-holders, *a* being the handle, *b* the metal arm, *c* the clips, between which is fixed the pen *d*. Fig. 3 shews an edge view of the clips *c c*, between which the portable pen is put, when a double-headed button *e* is slided along the slit *d*, which draws them together, and fixes the pen. Pens, in which the barrel is entire, are held by another modification of the foregoing clips shown at fig. 4. The specification describes a variety of other clever modes of fixing pens, but it omits to inform us by what means we are to cut a *quill*-pen with an *inclined slit*, as we do not think it is feasible with a common penknife; and as the patent is granted for a "new manufacture," the specification should explain the process for producing the article.

RIBAND WEAVING.—To Joshua Proctor Westhead, manufacturer of Manchester, a patent for "certain improvements in the manufacture of small wares," was granted on the 23rd of May, and the specification was deposited in the Enrolment Office on the 21st of November, 1831.

The improvements proposed by this patentee consist in an apparatus for rendering more uniform and certain the taking up the ribands, tapes, or other small wares during the process of weaving, and for rendering the action of the slay more accurate and regular than in riband looms of the usual construction. The improved taking-up apparatus consists of a series of short rollers slightly fluted or grooved lengthwise, with a corresponding series of plain loaded rollers resting upon them, similar to those used in mule spinning. The lower or fluted series of rollers being put in motion with the ribands or tapes between them and the series of upper rollers, by means of a lever and crank acting on a ratchet

wheel in connexion with the axis of the rollers, the other end of the actuating lever being in connexion with, and operated upon, by the prime mover of the loom, whatever that may be, produces the uniformity and certainty in the process of taking up the wares as they are woven. To give the wares more steadiness and friction to receive the action of weaving, they are passed over one rod and under another extending across the loom, before they are passed between the drawing or taking-up rollers.

The means of varying at pleasure, and regulating the action of the slay, is obtained by the substitution of cheese motions for cranks, that the connecting rod of the slay may be lengthened and brought nearer to, or further from, the centre of motion, to adjust the extent of vibration according to the purposes to which the loom is applied.

A considerable saving of room is obtained by the introduction of the cheese motions, by which a greater number of looms can be brought within convenient reach of the moving power, a matter pointed out by the patentee as one of the important advantages of his inventon.

LOCKS.—To George Barnard, Builder, of Bristol, a patent for "certain improvements in locks and other spring fastenings for doors and other places," was granted on the 23rd of May, and the specification was lodged in the Enrolment Office on the 23rd of November, 1831.

Three improvements in locks are claimed by this patentee: the first has reference to the spindle, on which are fastened the handles for withdrawing the bolt when the door is to be opened which consists of a contrivance by which the same spindle will answer for any door whatever be its thickness. This improvement he proposes to effect by making the spindle of two parts attached together by means of a rectangular hasp, made sufficiently large to hold both, but to fit them sidewise, so as to be operated upon by either. The spindle acts upon the bolt through the medium of a small crank and connecting link. The second improvement has reference to the spring which forces out the bolt, which, it is proposed, in order to increase its length, and consequently its flexibility, to attach to the lower part of the front plate, or that which is screwed on the edge of the door. A notch is cut in the lower side of the bolt for the upper end of the spring to act in, and a recess is cut into the door to admit of its acting freely. The third improvement applies to the key-hole,

and is intended to prevent the introduction of false keys. This object is proposed to be obtained by making the bit of the key of a zig-zag, or any other form, and then casting round it a small plate of brass, which is to be afterwards soldered on the inside of the key-hole in the lock plate, and thus is obtained a hole to fit the key with the greatest accuracy.

A fourth improvement seems to have occurred to this patentee after his specification had been written, for he has interlined a description of an improved check tumbler, which turns upon a centre, and projecting falls through the lower side of the bolt into a hole in the bottom lock plate, and thus prevents the bolt from being withdrawn till the tumbler is raised by the key.

RAISING WATER.—To Richard Fell, of Fountain Yard, Vauxhall Bridge Road, Middlesex, a patent for "improvements in machinery or apparatus for raising water, and in the application thereof to certain useful purposes," was granted on the 24th of May, and the specification was lodged in the Enrolment Office on the 24th of November, 1831.

This patentee has imagined that by two conical-barrelled pumps, with expanding pistons acting on the wide and narrow ends of the barrels alternately, power to an unlimited extent may be obtained; and when he introduces in addition a chamber for condensed air, two air-pumps and a considerable number of tortuous air and water-pipes, besides lifting valves, connecting rods, and vibrating levers, *ad libitum*, he gets a complication of machinery quite sufficient to induce in a person, unacquainted with the principles which regulate the action of air and water, a belief that power has been gained, instead of wasted.

We at first intended to give a drawing and a detailed description of the apparatus designed by this patentee, that others might see and avoid errors of a similar character; but we found, on a more close investigation of the apparatus, that the design comprehended so many original and out-of-the-way contrivances, that no person who has obtained the least knowledge of the first principles of hydraulics can possibly fall into similar errors, and herefore we have not deemed it necessary to encumber our pages with further details.

Some persons who have not read the patentee's specification, may possibly conceive that we have passed a harsh judgment upon this invention, but nobody who has read it will think so, we are quite assured. We sincerely lament that the patentee, besides

wasting his time and money in such an *untried* scheme, should have been so misled as to incur the expense of patents for it; we say "*untried*," because we are sure, that had it been tried, it would not have been patented.

WHEELED CARRIAGES.—To John Pearse, of Tavistock, Devonshire, Ironmonger, a patent for "certain improvements in wheeled carriages, and an apparatus to be used therewith," was granted on the 7th of June, and the specification was lodged in the Enrolment Office on the 7th of December, 1831.

The principal improvement proposed by this patentee have reference to a two-wheeled cart, and are represented by fig. 1, Pl. XX., where *a a* shews the body of a cart supported by means of the bent iron bar *b b*, connected to the frame *c c* and the axle *d* by means of the suspension rod *e*, and the sloping rods *f f*. *h h* are two chains attached to the fore and hind part of the cart, passing over the pulleys *i i*, and connected together by a rod extending along the frame *c c*. *k* shews a portion of one of the shafts by which the cart is drawn and guided. Now, when the frame *c c* is inclined by the position of the horse being lower than that of the wheels; in descending hills, the rod which connects the chains is drawn forwards, by which the back chain is pulled down, and the fore one permitted to rise, by which the body of the cart preserves a level position, and the shaft horse is saved from having an additional weight thrown upon his back; which is the case during the descent of a hill by a cart of the usual construction. It is evident from the arrangement of the supporting and connecting rods, that the reverse position of the body of the cart, with respect to the frame *c c*, will take place when the cart is drawn up hill, so that thehorse will continue to support his right portion of the load, and the cart will remain in a level position. We have described the arrangement of parts only on one side of the cart, but it follows of course that there is a similar arrangement on the other. The shafts and axletree are preserved at right angles to each other by means of a parallelogram consisting of two side rods; one is shown at *l l*, which connect axle to two rods in front, turning on two pivots near their middles, and in the centre where a projection from the one fits into a small recess in the other. *m* shows a jointed drag, which is forcibly pushed against the nave by the position of the supports, and stops the wheel from turning when descending a steep hill. Another kind of self-acting drag is also described in the speci-

fication, which consists of a friction band embracing the nave, and brought together by a lever of unequal arms, which is put into action by means of a rod proceeding from the horses breeching. This, which seems really ingenious, and calculated to become useful, secured by the introduction of a locking pin when the cart is to be backed.

An improvement in the axletrees and the fitting of the boxes thereon is next described in Mr. Pearse's specification, to consist of a shoulder, near the outer end of the axle, which is made of iron tubing, to prevent the nave box from going too far on, and it is prevented from coming off by a screwed collar on the outer end, by a screw entering the interior of the hollow axle. At the inner end of the box is fixed on the axle an iron collar, which has between it and the box a leather collar, to prevent the escape of oil.

The claims of the patentee are for the means of supporting the cord from a point below the centre of the wheel, and preserving its horizontal position while ascending or descending hills, the arrangement by which the wheels and the shafts are preserved in the same relative position while in the act of turning; the self-acting drags; his method of making hollow axles, and of securing the nave boxes in their places.

DISTILLING.—To William Gutteridge, of the Parish of St. John's Clerkenwell, in the county of Middlesex, Civil Engineer, a patent for "certain improvements in apparatus for distilling, and other purposes," was granted on the 18th May, and the specification was deposited in the Enrolment Office on the 18th of November, 1831.

The improvements contemplated by this patentee, apply in the first place to the method of communicating heat to the wash from which the spirit is to be distilled, which he proposes to do through the medium of steam, and therefore the first vessel, or that placed next the fire, is simply a steam boiler. The vessel over this is the still containing the wash, and the vapour arising therefrom is conveyed by a syphon neck through a shallow copper vessel, denominated parallelopipedons, which being surrounded by water condenses the most aqueous portion of the vapour, which is returned into the still; the uncondensed portion passes on to a second parallelopipedon, where another portion is condensed and returned, and so on till the vapour assumes any required degree of purity; when it passes off into a set of thin copper condensers, placed in

the bottom of a vessel containing cold water. There are two pipes leading from the distilling apparatus to the condenser, the one situated considerably higher than the other, that spirits of different qualities may be taken off at pleasure. These pipes are both provided with stop cocks, the plugs of which are connected together, so that the one may be turned off, and the other on, at pleasure, by the same operation of a lever handle.

SALT WATER.—To Thomas Westrup and William Gibbins, both of Bromley, in the county of Middlesex, Gentlemen, a patent "for improvements in converting salt or other water into pure or other water," was granted on the 24th of May, and the specification was enrolled in the Enrolment Office on the 23rd of November, 1831.

In the commencement of the specification of this invention it is mentioned, that distillation has been frequently attempted for rendering sea water fit for domestic purposes on ship-board, and that all the attempts have proved inefficient for want of an effectual means of producing condensation of the water when once converted into steam. With a view to effect this object, it is proposed by these patentees to place the condenser below the water line of the vessel, and to use the water in which the vessel floats, as a means of producing condensation. A close cylindrical worm tub is placed in some convenient part of the vessel, below the water line, having within it a coiled pipe or worm, communicating with a boiler surrounding the fire in the ship's hearth. Two communications are made between this worm tub and the external water, the one near the bottom and the other near the top. Now, as water becomes specifically lighter when heated, the column of water in the tub will, as it receives heat from the worm, ascend and pass out at the upper part, while its place will be supplied by cold water passing in through the lower pipe.

Simple as this plan appears to be, a still simpler and equally efficacious one, is described in the specification to consist in carrying the steam pipe from the boiler through the bows of the ship, and conveying it down in the angle by the keel to nearly the bottom, where it is brought through, to deliver the condensed or distilled water into a vessel provided for its reception.

MULE SPINNING.—To Thomas Knowles, of Charlton Row, in the county of Lancaster, Cotton Spinner, a patent "for certain improvements in certain machinery, by aid of which ma-

chinery, machines commonly called mules are or may be rendered what is termed self-acting; that is to say, certain improvements in certain machinery, by aid of which machinery, spinning machines, commonly called mules, are or may be worked by power, without requiring the usual application of strength of the spinners, to give motion to the handles or wheels, and to such other parts of mules as are are commonly worked by the strength of the spinners," was granted on the 23rd of May, and the specification was enrolled in the Petty Bag Office on the 23rd of November, 1831.

The intention of this invention to render mules self-acting is pretty clearly, though not very concisely pointed out in the above title, which is a fair specimen of the manner in which the specification is drawn up. It extends over seventeen skins of parchment, accompanied by a great variety of drawings. To the bare mention of the object of this patent we can at present add nothing, for the different contrivances, which are numerous, are too intricate to admit of their being understood by mere verbal descriptions, and our limits on this occasion do not admit of our giving drawings sufficient to explain them.

STEAM ENGINE.—To Samuel Hobday, of Birmingham, Snuffer and Toy Manufacturer, a patent for "a certain improvement in a machine to be worked by steam, that may be applied for the moving of ships, boats, and barges on the water, and to carriages either on the road or tramways; and in a fixed position may be applied to all the purposes that steam engines are now used for," was granted on the 24th of May, and the specification was lodged in the Enrolment Office on the 24th of November, 1831.

The engine proposed by this patentee is of the rotatory kind, and in construction it is one of the simplest we have seen. It is represented by fig. 4, Pl. XIX, where *a* shews a wheel turning upon, and communicating motion through the axis *b*. Upon the periphery of this wheel is placed a series of triangular steam stops or pistons *c c c c c*, which are enclosed on the two sides so as to make a rectangular channel open on the exterior, except where the strong circular piece *d e* encloses it, extending from the steam pipe *f*, to a distance exceeding that between two of the triangular pieces, so as to keep one space between these pieces always enclosed. *g* is a piston made to fit accurately by means of packing or otherwise, between the two side pieces; and supported on the vibrating fulcrum *h*, which turns on the pivot *i*.

The upper part of the piston *g* is made a portion of a circle, whose centre is at the point of vibration *i*, that it may fit steam tight against the lower part of the circular piece *d e*, while it moves out to allow the triangular pieces *c c c* to pass it. *k* is a spring for forcing in the piston or steam stop *g* after it has been moved by the inclination of the upper surface of *c*. While the inclination on the lower part of *c* conducts it uniformly back to its place. Another modification of this engine is shown in which there is a vibrating piston *g* on each side, and, consequently, fewer of the triangular pieces *c* are required.

This engine may be used with or without a condenser, and in any position either vertically, horizontally, or inclined, according to the position in which motion is required to be communicated.

PATTENS AND CLOGS.—To John Myatt, of Tabernacle Walk, Finsbury Square, in the county of Middlesex, Tailor, a patent "for his invention of an article to be worn on the feet as a substitute for pattens or clogs, which he denominates Myatt's Health Preserver," was granted on the 27th of September, and the specification was enrolled in the Enrolment Office on the 26th of November, 1831.

One of Myatt's Health Preservers or substitutes for pattens, is represented by fig. 3, Pl. XIX, where *a a* shows the sole of the patten, *b* the toe leather, and *c* the heal leather; *d* is the heel ring attached to the patten by three or more projecting pieces; *e* is the fore ring turning upon a pivot at *f*, prevented from turning backwards by the stud *g* projecting from the sole of the patten, but allowed to turn forward to suit the rolling motion of the foot necessary to comfort in walking. This ring is kept up to its place by means of the spring *h* attached to the sole of the patten at some distance behind the place where it acts on the ring. The heel and fore part of the patten are made separate, and connected together by a spiral spring *i*, surrounding a bolt which is attached to the one and passes into a cavity made in the other for its reception. By this spring the two parts of the patten are so forcibly drawn together as to be kept on the shoe without tying or strapping, a matter of no small importance, though the pattens and clogs will, under such circumstances, require the aid of a shoeing horn to bring them on the shoes. The substitute for clogs differs only from the foregoing in having wooden projections instead of the sole and heel rings.

AMERICAN PATENTS.

For an improvement in the production of light, by a combination of liquids; ISAIAH JENNINGS, *City of New York, October* 16.

THIS patent is taken for a material which is to be substituted for oil in common lamps. The material is a mixture of alcohol and spirits of turpentine.

"To produce light from alcohol and spirits of turpentine, mix equal or unequal parts of each, agitate them that they may mix together; let them stand awhile, and the alcohol will be combined with a small quantity of turpentine, and the remainder will be separated; draw off the alcohol, and the small portion of turbentine combined, which is about one-eighth part, and it will be ready for use."

"I claim the admixture of alcohol with spirits of turpentine, and its application to common lamps, with or without wicks."

We have seen the above mixture in combustion in an Argand's lamp. The flame was clear, dense, and brilliant. The light may be made greatly to exceed that from oil, without the escape of any smoke; and there is not the slightest odour of the turpentine. The patentee says the mixture is as cheap as spermaceti oil, and that he is making arrangements which will enable him to afford it at a cost considerably below that material. The wick is scarcely blackened by the combustion; there is no dripping from the lamp, and no grease.

Chemists knew the fact that alcohol and spirits of turpentine would combine, and burn with a bright light; but we are not aware of their having been proposed to form an article for the supply of lamps, and one which might be advantageously employed in domestic economy. The patentee has used this composition with a wire wick, and has found it to answer well. Fibrous asbestos would probably be preferable, but this is a point of mere curiosity, as cotton wick is always at hand, and none better need be desired.

The friends of temperance will not object to the burning of alcohol.

For a Machine to pick up Apples from the ground, under the trees. SAMUEL LANING, *Camden, Gloucester County, New Jersey, November* 1.

THIS machine is to be driven on by handles formed like those of a wheel barrow. A drum, or cylinder, stands in the place of the wheel, extending across the machinery, and being about 16 inches long. The heads of this cylinder form projecting rims extending three inches beyond the cylinder; these rims serve as wheels to the picking machine, and sustain the cylinder at the distance of three inches from the ground. Pointed wires serve as pickers, by running

into the apples. A comb above the cylinder removes the apples from the pickers, and conducts them down into a basket suspended to receive them, which, when filled, is to be replaced.

The claim is to "the employment of a cylinder with pickers for the purpose of picking up apples from the ground, and the comb, or slats, for taking the same from the pickers, and delivering them into a basket, in the manner, and for the purposes herein described."

For a Machine for thrashing Grain and shelling Corn. EDWARD THURSTON, *City of New York, November* 1.

THIS machine is to have a cast-iron cylinder, which is to be fluted, or ribbed, from end to end. There is also to be a hollow segment similarly fluted. This hollow segment is to be borne up against the roller by spiral, or other springs, and is fixed upon a frame, to which a weight is hung, to co-operate with the action of the springs. The claim is to the combination of the balance and spring bed, and to the entire cast-iron cylinder.

For Combined Spiral Springs, for Clocks. SILAS B. TERRY, *Plymouth, Litchfield County, Connecticut, November* 3.

THE object of this invention is to combine several spiral springs together, in such a way, that a clock when wound shall run three or four times as long as with a single spring.

The patentee says, "instead of a single spiral spring, such as is commonly used for spring clocks, or time pieces, I employ two, three, four, or more, such springs, but made narrower than those which are usually employed; so that two, three, or more, need not collectively be wider than the common clock spring.

"I sometimes enclose each spring in a barrel, resembling the barrel usually employed; but only of sufficient depth to receive the spring. Such barrels and springs may be connected with each other, and made to act in combination.

"Instead of forming a barrel, I sometimes use a circular plate, having near its periphery a number of projecting pins. These projecting pins answer the purposes of the rim in the barrel, as they retain the spring in its place, and one of them serves to fasten its outer end, by merely giving it a turn, that it may slip over one of the pins. A circular piece is fastened on the opposite side of this plate, to receive the inner end of a spring.

"Upon this plan, such a number of springs may be added as shall give the desired number of turns, and a wheel and pinion be saved in the construction of a time piece.

"From the great length of spring afforded by this combination, a uniformity of action is secured, which will cause a time piece to which it is applied, to act with greater regularity without a fusee,

than is possible with the ordinary spring; whilst from its great flexibility, the spring is less liable to break, or to fail in any way.

"What I claim as my invention, and for which I ask a patent, is the combining, or connecting together, a number of spiral springs, upon the principle, and for the purposes herein before described."

For an Improvement in the Power Loom. JOHN STANDISH, *Belfont, Providence County, Rhode Island, November* 11.

"My improvement in weaving consists in pressing the cloth beam against the yarn beam, by levers, as is clearly explained in the drawing annexed, fully complying with the requisitions of the patent act. The advantage resulting from my improvement, is in consequence of the two beams revolving with equal motion. As the yarn is discharged from the yarn beam, the cloth is wound upon the cloth beam with an equal, steady motion; avoiding the inequalities in the cloth as woven in the usual method."

The foregoing sententious paragraph, comprehends nearly the whole of the specification. In it is contained the description of the machine, an account of its utility, and a decision that the patent law has been fully complied with. We hope for the sake of the patentee, that the plan may be found to be new, useful, and profitable.

The arrangement is well represented in the drawing. The gudgeons of the cloth beam run in moveable uprights, connected together by a bar, and are operated upon by a weighted lever. No machinist would be at a loss in carrying the plan into operation, the simple idea being once given.

For an Instrument for stemming of dry Tobacco. GERMAIN BREANT, *City of Richmond, Virginia, November* 11.

A STRIP of steel about eight inches long is fixed upright upon a table. Through this strip there are three holes of different sizes; the stem is to be drawn through one of these holes, when its sharp edge will strip the leaf from the stem. The strips, the patentee says, are much more perfect than those obtained by hand. The quantity of leaf is greater, and a new hand can perform the work with the same facility as an adept.

For an Improvement in the Art of manufacturing all kinds of Bottles, Decanters, and other pressed hollow Glassware, with the neck or apertures smaller than the cavity or inside diameter of the vessel. JOHN M'GANN, *Kensington, Philadelphia County, Pennsylvania, November* 26.

WHEN a decanter, or similar vessel, is to be made, there are to be two moulds, with there proper presses. In one mould the lower part of the decanter is formed, in the other, the upper part and neck.

One of the moulds is fixed to a hinge in such a way, that when the cores of the two parts are withdrawn, one mould will turn over upon the other, and bring the edges of the glass into exact contact, when, by a slight pressure, they are made to adhere; the moulds are then opened, and the decanter removed from it.

The claim is to that construction of the cores and moulds which enables the operator to form vessels of glass, in the way above described.

Specification of a Patent for improvements in the Saw Set. Granted to EBENEZER WHITING, *Berkshire, Tioga County, New York, October* 15, 1830.

To all whom it may concern, be it known, that I, Ebenezer Whiting, have invented certain improvements in the saw set, which improvements are applicable to saws of all descriptions, and that the following is a full and exact description of the same.

The saw set which I use operates upon the principle of punching, and is represented in the drawings which accompany this specification. Fig. 1, exhibits a convenient form for the saw set when used for hand, panel, or other similar saws. It has a shank by which it may be firmly fixed in a vice, or in a hole made in a bench for that purpose. The punch is sustained by a spring attached to the iron support, which is usually cast in one piece with the shank. A piece of tempered steel is let into the iron, immediately under the punch, and forms the bed between which and the punch the saw tooth stands when it is to be set. There are two pins, or wires, which serve as guides to the saw teeth as they are successively set. The punch is filed so that its two sides which meet between the pins, form an acute angle, so as to be adapted to the form of a saw tooth. A plate of brass, or other metal, upon which the blade of the saw is to rest, is made to raise, or lower, by means of screws, which are tapped into the iron part of the frame through which they pass, and swivel in the plate above. A bent spring bears upon the heads of the screws, to retain them in their places. See fig. 2, Pl. XIX.

Fig. 3, is the same principle adapted to saw mill, cross cut, and other large saws. The pins which guide the teeth are not seen in the drawing, as they are hidden by the punch. They rise, however, from a steel bed, as in the former instance, and the punch, instead of being filed to an acute angle, is left square, and has two holes drilled in its face to admit the pins, and allow the punch to play. There are two screws by which to regulate the set of the saw, and also a bent spring. There is, on the back, a mass of cast iron which serves for a handle, and at the same time by its inertia, sustains the stroke of the hammer when a tooth is set.

I do not claim the setting of saws by punching, the same having been heretofore practised; but what I claim as my improvements, are, the use of the two pins to guide the tooth of the saw; the making of the iron frame so that the limbs which contain the screws form

a T with the body of the instrument; the mass of metal to prevent the recoil of the instrument when struck with a hammer; the manner in which the set is regulated by means of the screws, and the general arrangement of the whole to produce the intended effect.

EBENEZER WHITING.

Specification of a Patent for a Machine for scraping the Flesh and Hair from Hides and Skins in the Process of Tanning, and for Dressing the same, and also for all other scraping necessary in tanning, currying, and leather dressing. Also for cleaning wool on sheep skins, and taking the same therefrom. Granted to THOMAS WILLIAMS, *Rochester, Monroe County, New York, November 4,* 1830.

THIS machine consists of a wooden frame, in which is set a cylinder of wood furnished with four knives of steel or iron, so placed upon the cylinder as to form obtuse angles on opposite sides of the same. The cylinder is turned by horse or water power, or may be turned by a crank by hand. The object of the knives is to scrape the flesh, or hair, from the hides or skins; the edges may be made sharp, or obtuse, according to the purpose for which they are used. The hide, or skin, is placed beneath the cylinder between that and a bed piece, which bed piece is so made as to fit the lower surface of the cylinder. The hide, or skin, is carried under the cylinder, and kept smooth by the angular and spiral position of the knives. The object of the bed piece is to press the hide or skin equally upon the edge of the knife. The pressure is regulated by a weight attached to two levers, by which the bed piece is raised or lowered. These levers are attached to a weight which consists of a box or trough filled with weights; or, instead of a trough and weight, a spiral spring. This weight is raised or lowered by means of another lever, placed on the frame work, above, and connected with the weight by a rod or line. There is a small cylinder placed parallel to the one above described, and turned by a crank. The object of this cylinder is to wind up the hide or skin after it has undergone the process of scraping from the knives; the hide or skin is attached or fastened to the last mentioned cylinder, by pressing a part of it into a long mortise with a bar made to fit the mortise.

THOMAS WILLIAMS.

Specification of a patent for a new and useful method of supplying the Boilers of Steam Engines with Water. Granted to JOHN S. WILLIAMS, *Maysville, Mason county, Kentucky, November* 17, 1830.

1. THERE must be a water chamber placed at the horizontal level, with the height of the water is intended to maintain in the boiler, or boilers, intended to be supplied.

2. The water chamber must open into the supply water by a communication furnished with a valve opening toward the water chamber. The supply water must be higher than the water chamber, so as to run in of itself, or be forced in by a pump, or be drawn in by a vacuum.

3. The water chamber must open into the boiler intended to be supplied, below the height of the water it is intended to maintain in the boiler, by a communication furnished with a valve opening into, or towards the boiler.

4. The steam in the boiler above the water must open into the water chamber above mentioned by a communication which can be opened or shut at pleasure.

5. The water chamber must open upwards into the atmospheric air, or a vacuum, by a communication that can be opened or shut at pleasure.

It is evident from the principles of hydrostatics, that if the steam of the boiler be shut out of the water chamber, and the communication be opened upwards from the water chamber into the atmospheric air, or a vacuum, that the supply water will flow through the communication described in the second head, above, and fill the water chamber.

It is equally evident that if that communication described in the 5th head above, be then closed, and the steam in the boiler be let into the water chamber, by the communication described in the 4th head above, that the water in the water chamber will flow into the boiler through the communication described in the 3d head above, until the water in the water chamber, and that in the boiler, shall maintain one level.

It is also evident that by alternately opening and shutting the two communications described in the 4th and 5th heads above, that the water chamber will be alternately filled with supply water, and emptied into the boiler, as long as the alternate opening and shutting are continued. Hence it appears that the supply of water in the boiler will not only be kept up from without, but that it can never rise higher nor sink lower in the boiler than a line above the level of which the water chamber shall have sufficient capacity to supply the water in the boiler during one operation of alternately filling and emptying the water chamber. JOHN S. WILLIAMS.

An Explanation of the Drawing illustrative of the Apparatus, is given at fig. 4, Plate XIX.

A, boiler. B, water chamber. C, supply water. D D, valves. E, F, cocks. When the cock, E, is open, and F closed, the pressure in the boiler will close the valve between it and B, and the supply water will flow into the water chamber, through the valve between it and C. Shut E, and open F, and the steam from the boiler will pass into B, its pressure will close the outer, and allow the inner valve to open, when the water will flow into the boiler, and stand at the same level in it and in the water chamber.

The capacity of the water chamber above the water line, must be equal to the waste of the water in the boiler during the filling and emptying of the water chamber. And if the operation of alternately opening and shutting E and F, be kept up, the water in the boiler will never rise higher nor sink lower than the water line, while the supply water continues in C.

Specification of a patent for an improvement in the mode of combining Printing Types for Music. Granted to GEORGE BRUCE, *City of New York, November* 27, 1830.

IN combining printing types for music in the manner here contemplated, the lines of the staves are formed with separate rules, and the characters are cast in sections, or pieces, to occupy the spaces between the lines or rules, being cut, or divided by the rules, wherever they intersect, and forming with them perfect characters.

I claim as my invention the use of separate rules, which, in combination with suitable types adapted to the spaces, between the rules, shall form perfect characters of any required description. By this method the lines of the stave are more perfect than by the old method of casting characters and lines together; kerned types are unnecessary, the number of characters is reduced, the use of them in printing facilitated, and the cost decidedly diminished. GEORGE BRUCE.

Accompanying the foregoing specification are two specimens of printing with the types described. One of them the sections of types without the rules, which exhibits the spaces which the rules are to occupy. The other the types combined with the rules. Its appearance is neat and distinct, and we think it a real improvement on the former modes of casting types for printing music.

ON THE CAUSES OF SOME EXPLOSIONS OF STEAM BOILERS.

By THOMAS EARLE.

Read before the Franklin Institute, February 24, 1831.

THERE have been several instances of explosions of steam engines, upon pumping additional water into the boiler, although the steam, before the addition of the water, had not shown a high expansive power. It is generally agreed, that immediately before these occurrences, the water has been very low in the boiler, the iron of the flue laid bare, and become very hot, and the steam also probably heated to an unusally high degree. But a doubt has arisen whether the heat that produces the great excess of steam, which causes the explosion, is borrowed from the hot iron, or from the hot steam previously in the boiler. The object of this paper is to endeavour to do something towards settling this question.

Question 1. If heat be borrowed from steam at a high temperature, to convert additional water into steam at a lower temperature, will the whole quantity of steam thus obtained possess more elastic force under a given volume, than belonged to the hot steam alone.

It is an ascertained law of steam and of all gases, that equal additions of temperature, give nearly equal additions of volume. It is also ascertained that gases and steam for each degree of heat they receive, gain about $\frac{1}{480}$ of the volume they occupied at 32° Fahrenheit. This would give a gain of $\frac{1}{660}$ of the volume occupied at 212°, for each additional degree of heat above that point. Hence, an addition of 660 degrees of heat, should increase one volume of steam, at 212, to two volumes, under the same pressure, or should double its power.

Then if we have water at 212, and to 1 gallon, add 960 degrees of heat, we get about 1700 gallons of steam, under atmospheric pressure: then put 960 degrees more of heat, and another gallon of water, we increase the steam to 3400 gallons: whereas if, in the last case, we have added the heat to the steam already made, 663 degrees would have sufficed to increased the steam to 3400 gallons. Thus $960 + 960 = 1920$ degrees of heat, in the first case produced no more effect, than $960 + 663 = 1623$ degrees do in the latter. Heat added to steam *already formed*, is, therefore, more effective than the same quantity of heat added to hot water: and the theory of explosions from water converted into steam, by heat borrowed from other steam, cannot be true, unless the specific heat of steam be much greater than that of water, under equal weights; or, in other words, unless it takes a much greater absolute quantity of caloric to raise a pound of steam one degree, than it does to raise a pound of water one degree.

Dr. Crawford, from his experiments, inferred that the specific heat of steam was 50 per cent. greater than that of water. If this were correct, the effect of a certain quantity of caloric added to steam, or added to hot water, would be just about equal. But the more recent, and generally believed, more correct experiments of Delaroche and Berard, give a greater specific heat to water than to steam, in the proportion of 1,000 to 0,847. From this it would result, that heat added to steam, produces nearly double the effect which it would have done, if employed to generate more steam. On the whole, assuming as correct either Mr. Crawford's conclusions, or those of Delaroche and Berard, explosions connot be produced by pumping even water at 212 degrees into highly heated steam, without the aid of some other cause.

Question 2. Can explosions be produced by pumping water on red hot iron?

The specific gravity of iron compared with water is as 7.788 to 1,000, say as 8 to 1; and the specific heat of hot iron compared with water under equal weights is as 0.1255 to 1: say as 1 to 8.* It takes

* Some experiments tend to show the specific heat of iron, compared with that of an equal weight of water, to be as 1 to 9. The difference, however, is entirely immaterial to the purposes of this essay.

about 8 times as much caloric, to heat a pound of water one degree, as to heat a pound of iron one degree: but about equal quantities to heat a given *measure*, say one cubic inch, of each substance. Consequently a cubic inch of iron at 300 degrees, on being reduced to 250 degrees, parts with nearly 1700 times as much heat, as a cubic inch of steam at 300, reduced to the same degree: and a cubic inch of red hot iron at 1172 degrees, has heat enough to convert one cubic inch of water into 1700 cubic inches of steam.

Hence it appears extremely easy to produce explosions from throwing water on hot iron, as indeed is proved by Perkin's steam gun. If that gentleman's generators had been no stronger than ordinary boilers they would have been destroyed by one-third of the power which he produced by throwing water on their red hot iron: and strong even as they were, they would have exploded had he pumped in a sufficient quantity of water, without giving vent to the steam produced.

A cubic foot of hot iron by being reduced to 32 degrees, would furnish heat sufficient to convert a cubic foot of ice cold water into 13,600 gallons of steam, at atmospheric pressure: and a single square foot of boiler iron, $\frac{1}{8}$ of an inch thick, if only at a bright red heat, has caloric enough to make 88 gallons of steam. It is probably not very uncommon for boilers to become so destitute of water, that 10 or 15 square feet become red hot. This surface, by losing only half its heat, would produce steam enough in addition to that already existing, to explode almost any boiler.

The sudden cooling of a part of the boiler, no doubt weakens it very much, and hence we find some boilers in their rupture following the water line, which line was probably made by a fresh supply of water, or by a motion of the steam boat raising the water upon the heated iron of one side.

The explosions which have occurred about the period of coming to, or leaving a wharf, may be attributed to the boat's being thrown partly on one side, either in turning, in striking the wharf, or under the weight of passengers shifting their position, so that the water is thrown upon hot iron of the boiler.

The conclusion to which I come, is, that a considerable proportion of the explosions which occur, is occcasioned by water being thrown on highly heated iron. The proper preventives, are, care in engineers, and such construction of boilers, that the part exposed to the greatest heat will not be soonest laid bare, nor a large surface either suddenly laid bare, or suddenly covered by water: also to throw the water into the bottom of the boiler, rather than by a jet into the upper part.

END OF VOL. VI.

Coe, Printer, 27. Old Change.

Calvert's Pat.t Saddle

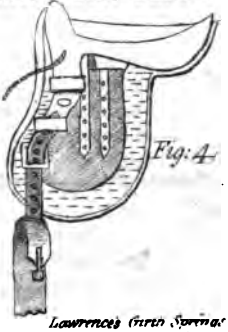


Fig: 4.

Lawrence's Girth Spring.

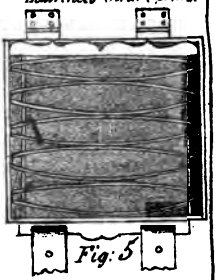
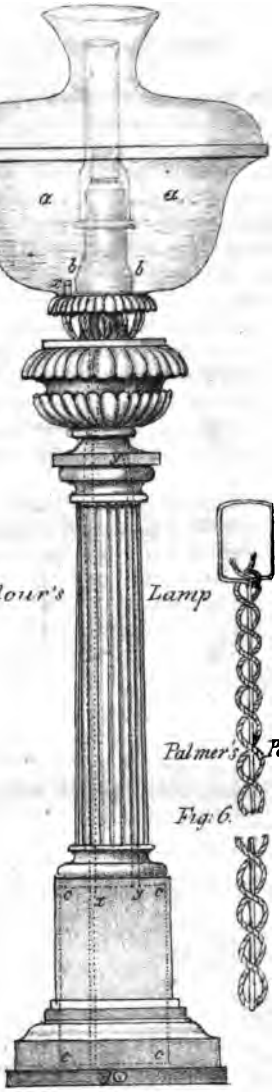
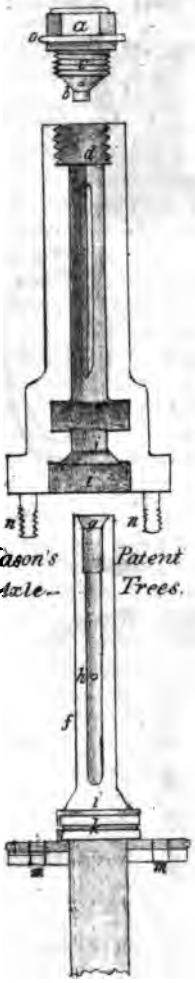


Fig: 5

Parlour's Lamp



Mason's Axle-Patent Trees.



Palmer's Patent Candles

Fig: 6.

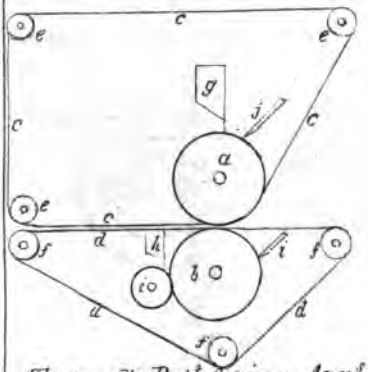
Fig: 7

Down's Patent Gas Retort.

Fig: 2.

Drawn by L. Hebert.

1. April 1831.



Towgood's Pat.t Sizing Apps.

Ericsson's Patent Steam Eng.

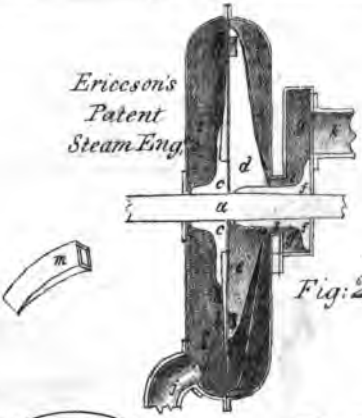
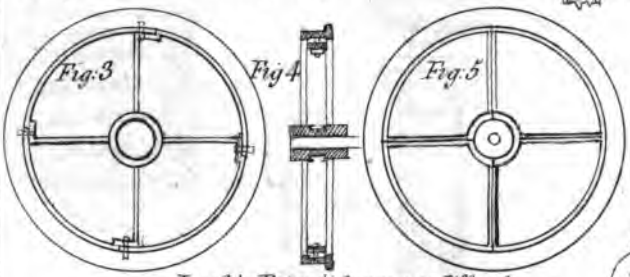


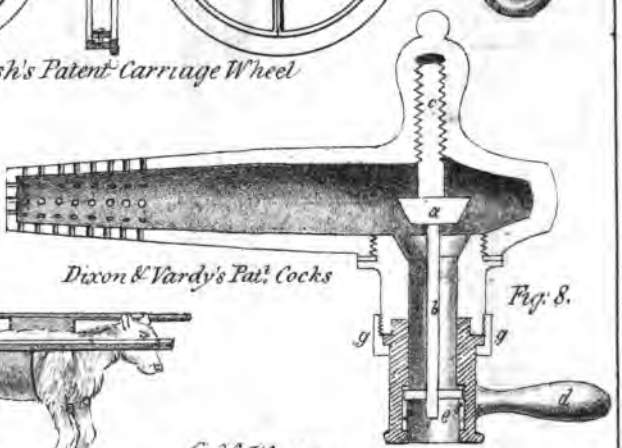
Fig: 2.



Losh's Patent Carriage Wheel

Fig: 6

Fig: 7.



Dixon & Vardy's Pat.t Cocks

Fig: 8.

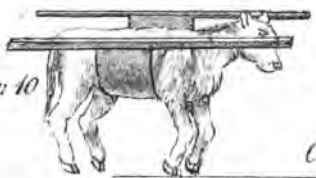


Fig: 10

Calf Waggon.

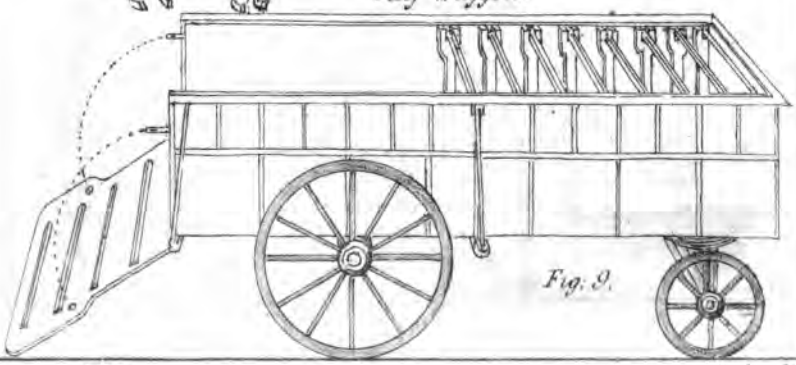


Fig: 9.

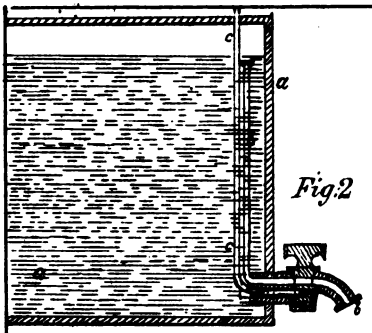


Fig: 2

Cooks Patent Cocks.

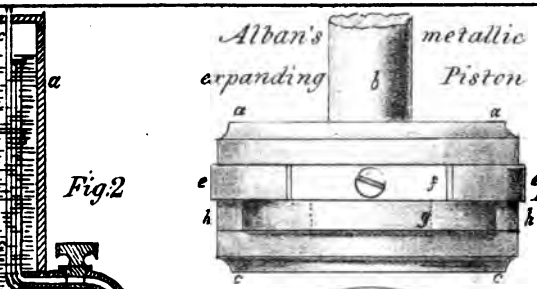


Fig 5.

Fig 3

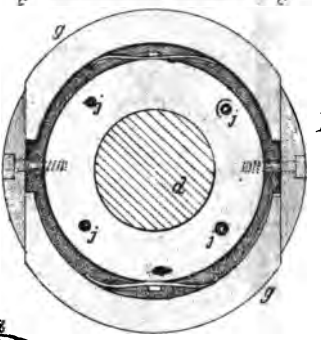
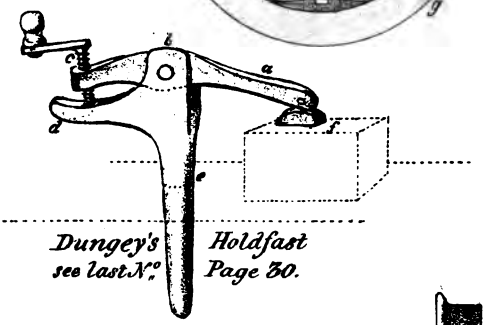


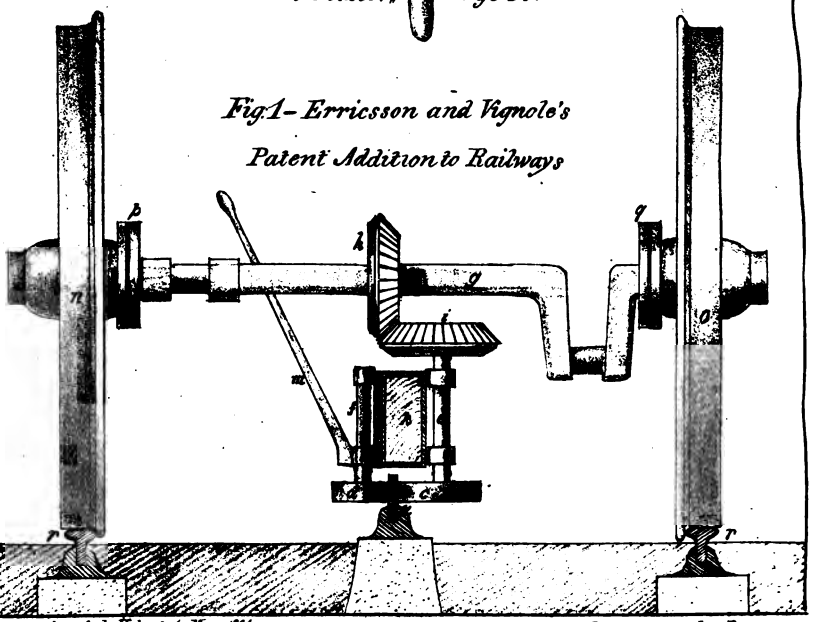
Fig: 6

Fig: 4. Church's Patent Boat



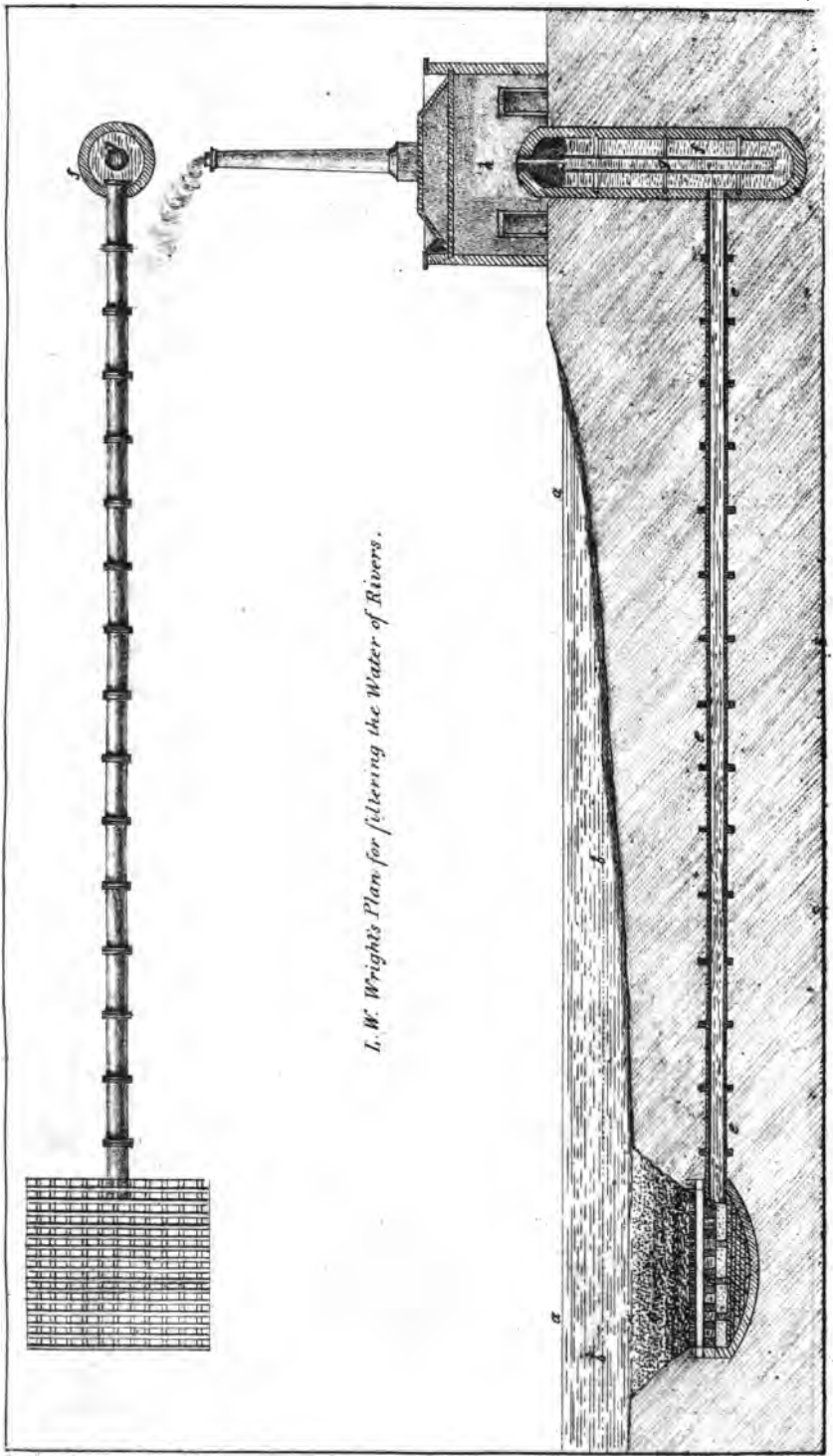
Dungey's Holdfast
see last N.° Page 30.

Fig: 1 – Erricsson and Vignole's Patent Addition to Railways



Drawn on stone by L. Hebert 4. May 1831.

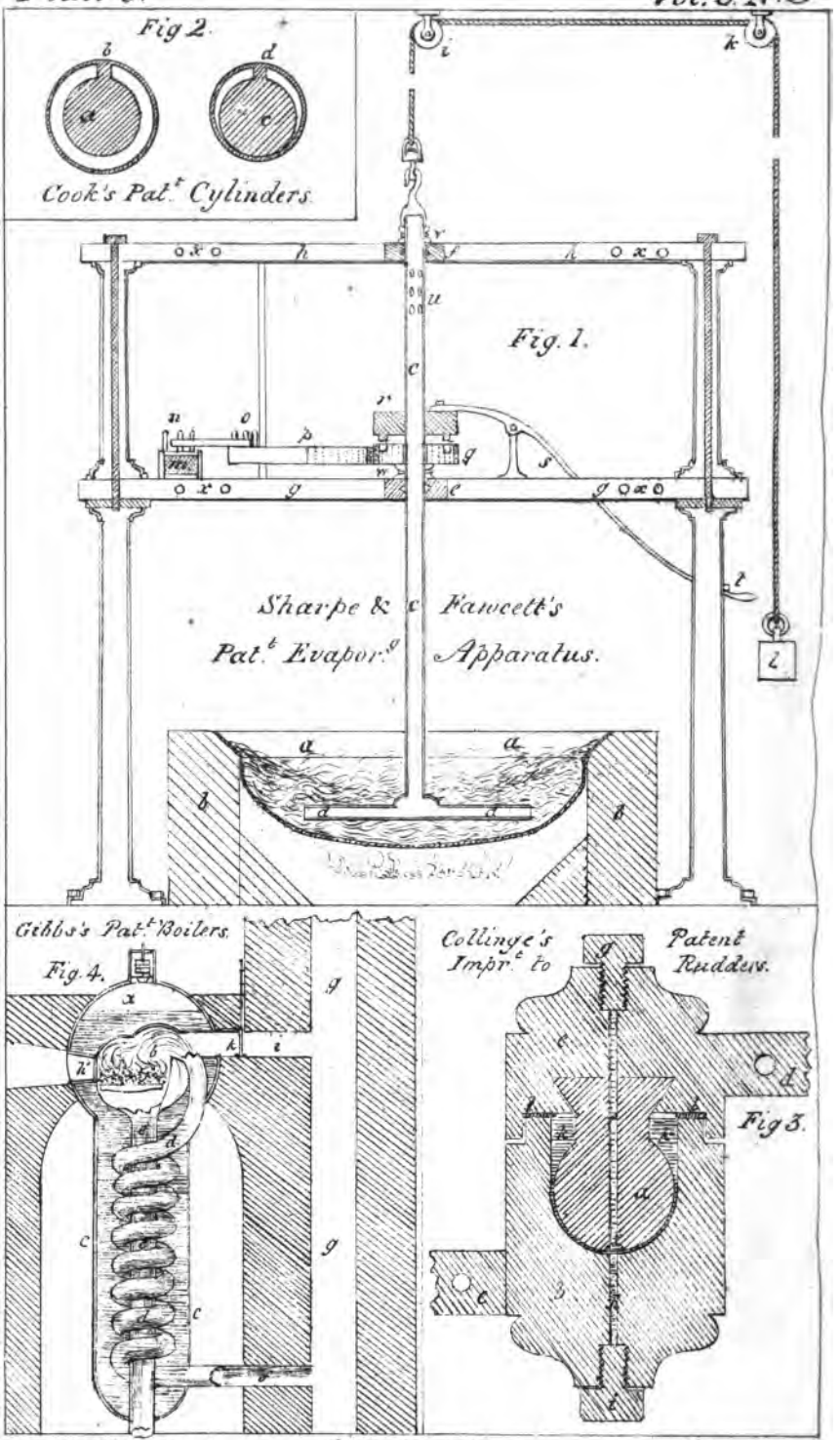
Printed by A. Gordon, Paternoster Row



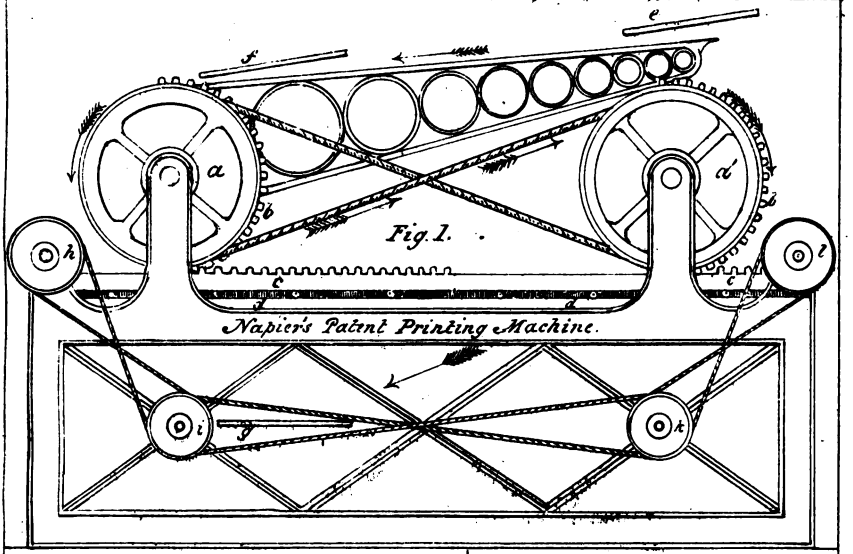
L. W. Wright's Plan for filtering the Water of Rivers.

Drawn by L. Hebert 1 May 1831.

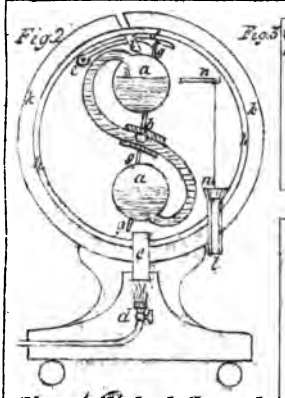
A. Gurlan's Lithog.ph 66 Paternoster Row.



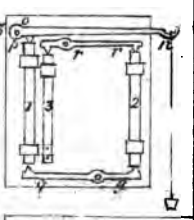
Sketched by L. Hebert. (E. Lake, Lithog.) 1st June 1831.



Napier's Patent Printing Machine.

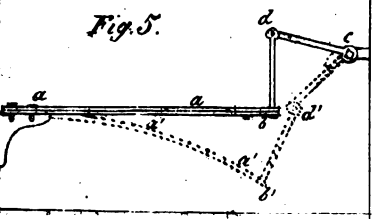


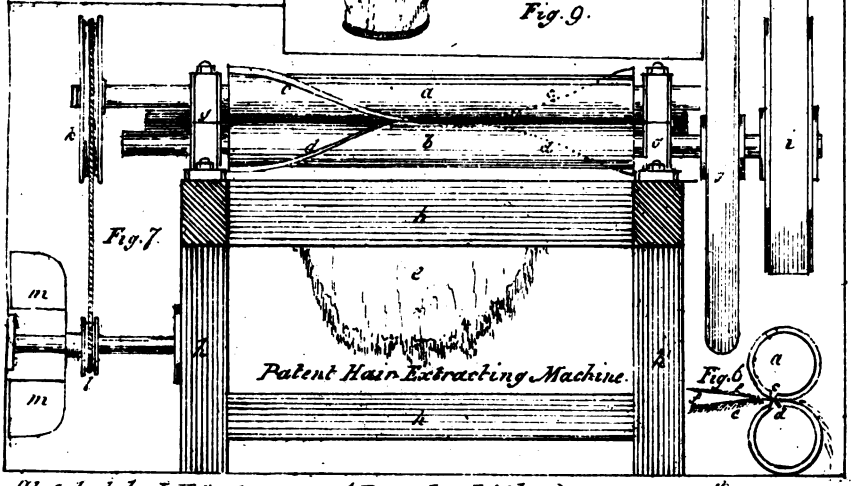
Clegg's Patent Gas-meter



Braidwood's Fire-escape

Dr Ure's Patent Therm. stat.





Patent Hair Extracting Machine.

Sketched by L. Hebert (E. Lake Lithog.) 1st June 1831.

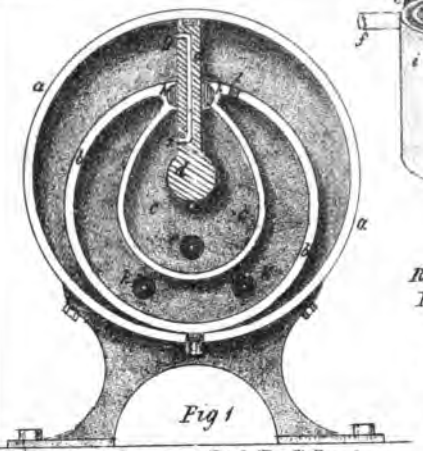
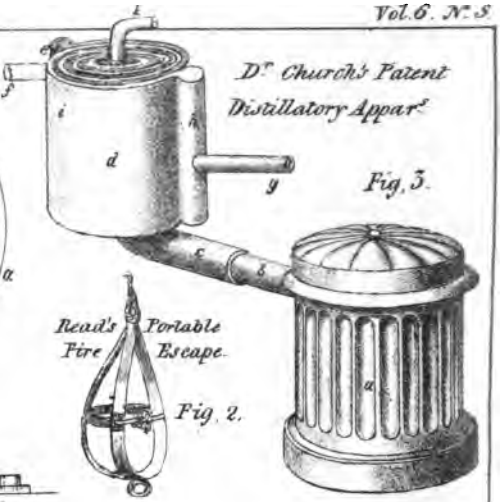


Fig 1

Lord Cochrane's Patt Rotty Engine

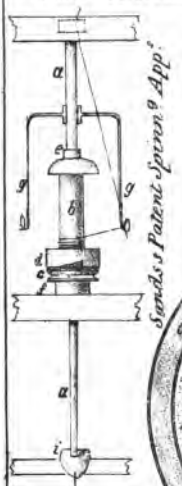


Dr Church's Patent Distillatory Apparts

Fig. 3.

Read's Portable Fire Escape.

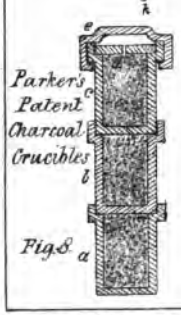
Fig. 2.



Sands's Patent Spinning App.s

Fig 4

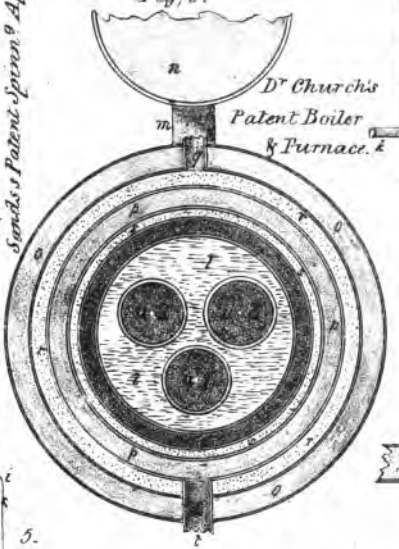
Fig. 5.



Parker's Patent Charcoal Crucibles

Fig. 8.

Fig. 6.



Dr Church's Patent Boiler & Furnace.

Fig. 7.

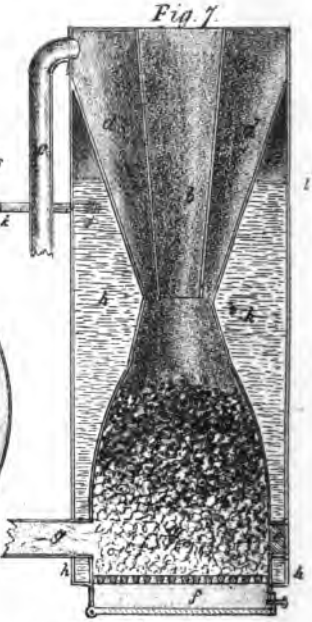
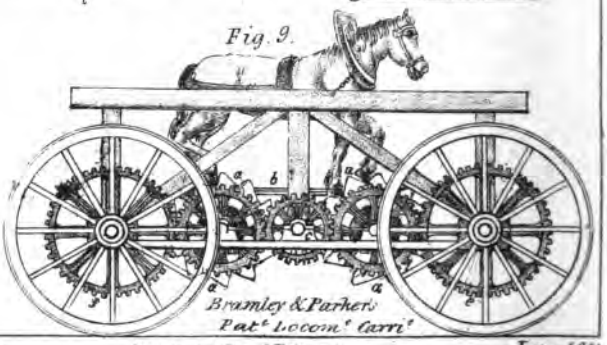


Fig. 9.

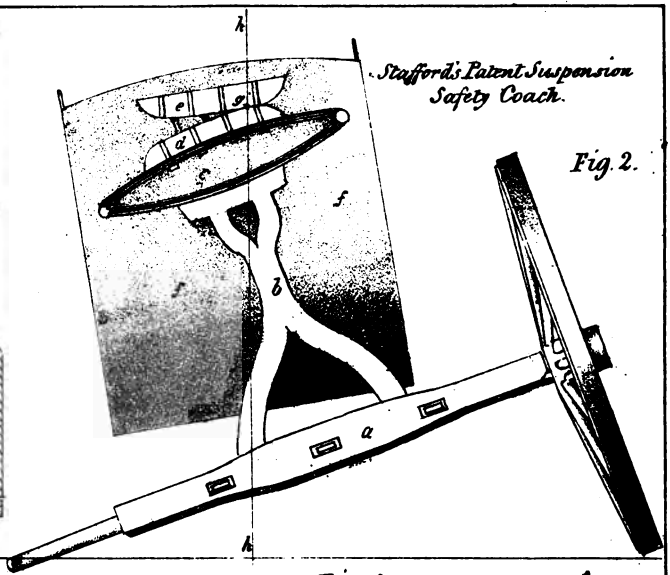


Bramley & Parker's Patt Locom.e Carri.e

Drawn on Stone by L.H ebert / E. Lake, Lithog.c Printer / July. 1831

Fig. 1.

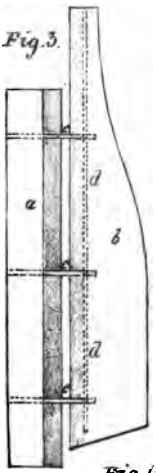
Bramley & Parker's Patent Axletree.



Stafford's Patent Suspension Safety Coach.

Fig. 2.

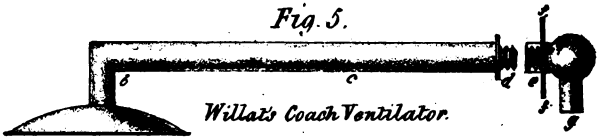
Fig. 3.



Admiral Brooking's Patent Rudder

Fig. 4

Fig. 5.



Willat's Coach Ventilator.

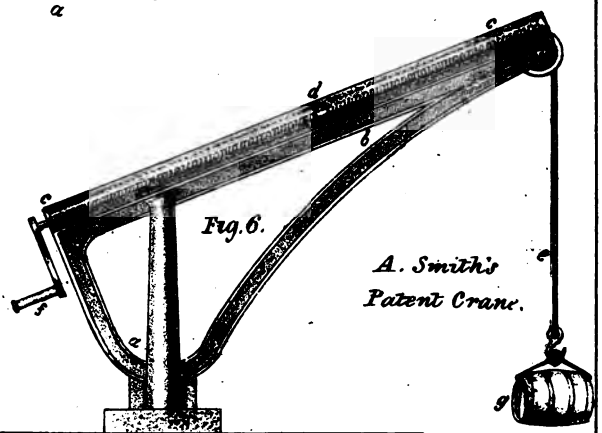
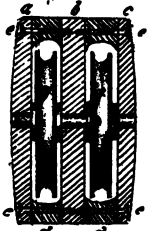


Fig. 6.

A. Smith's Patent Crane.

Ronalds's Impd Pulley Blocks.



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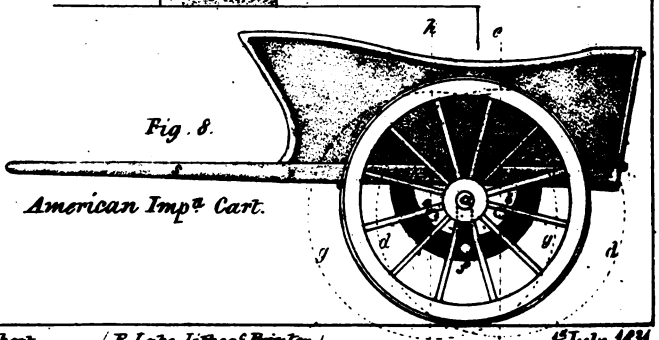

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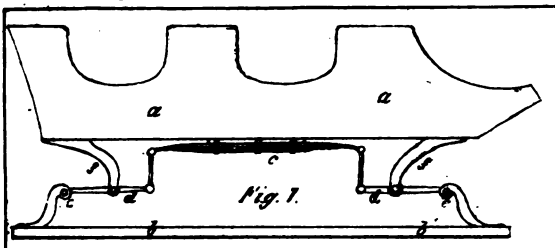
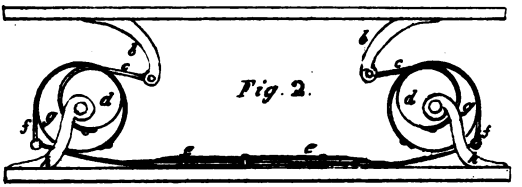

a
a
c
Fig. 1.
b
b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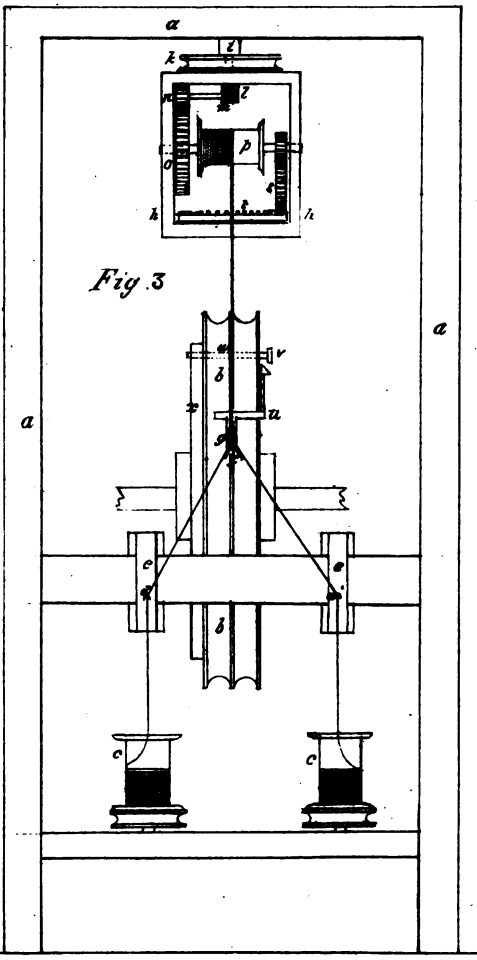
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Fig. 3
a
a
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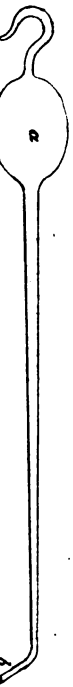
Fig. 5.

Fig. 6.



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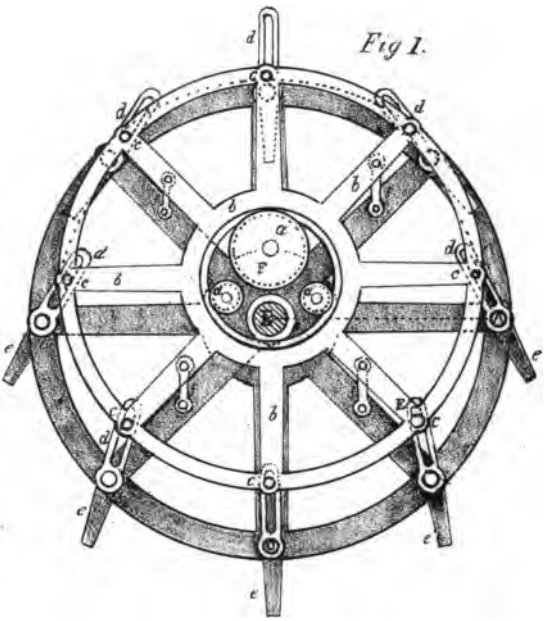

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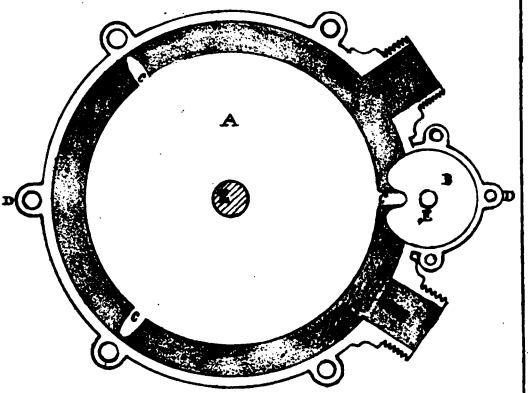

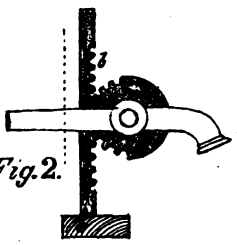

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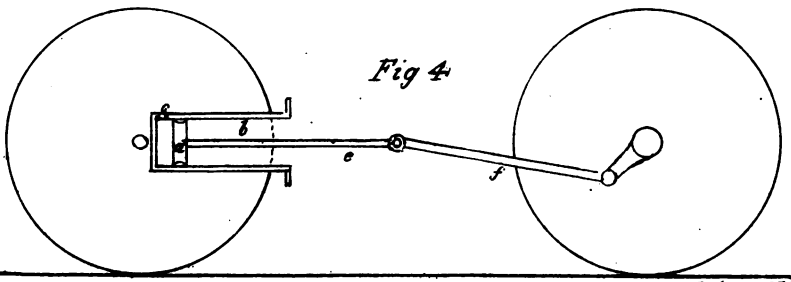

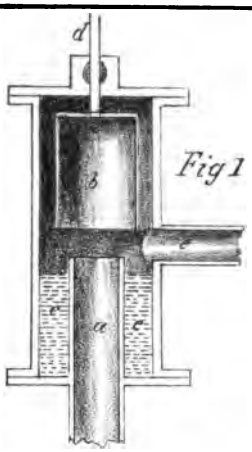

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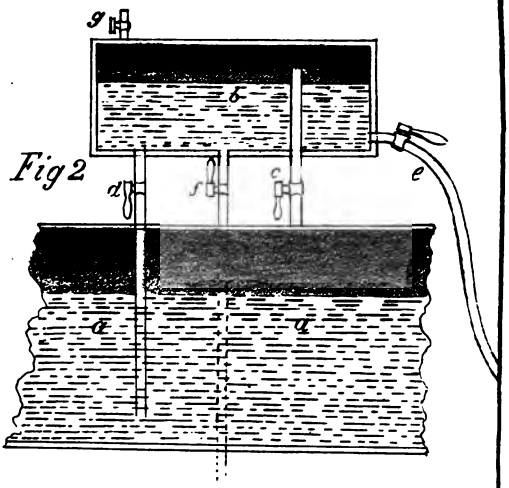

Fig 2

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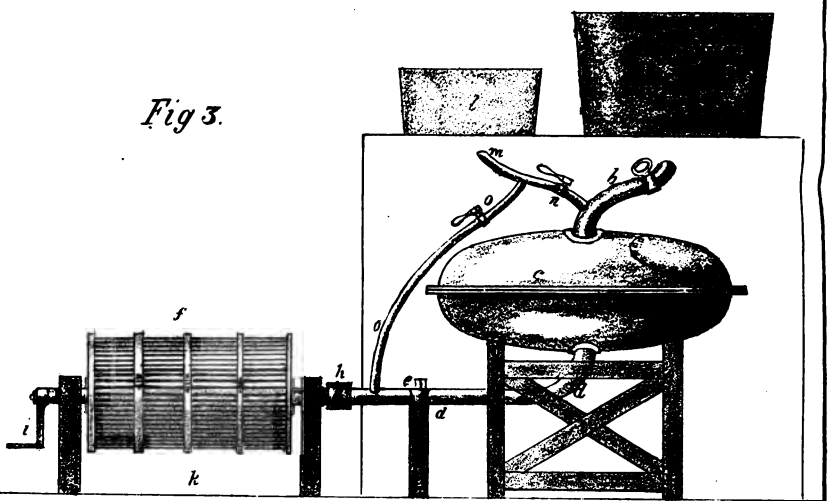

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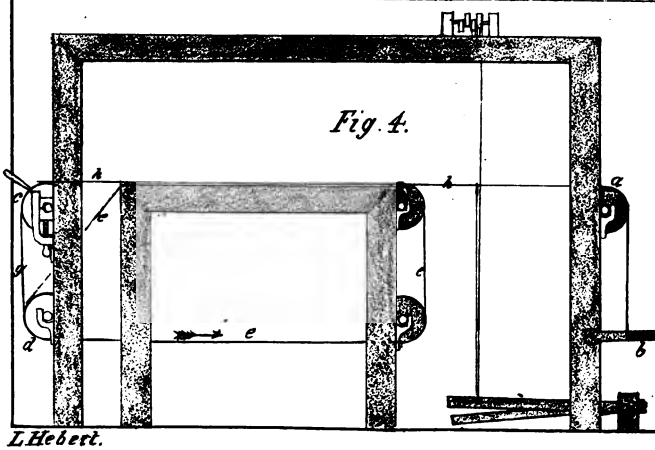

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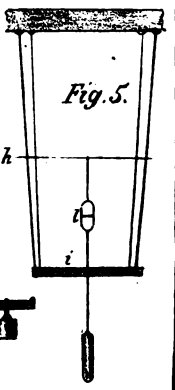

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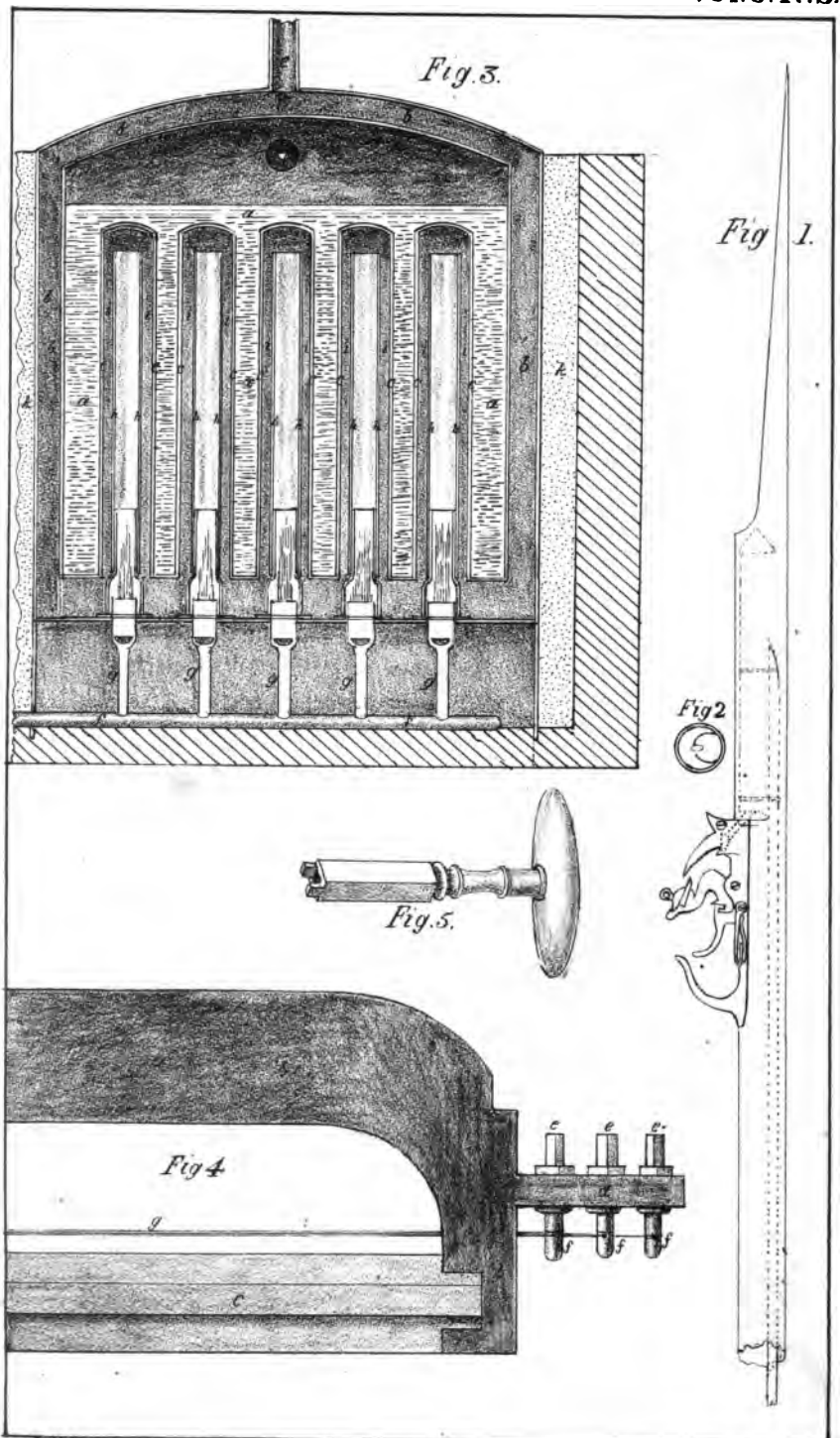
Fig.3.
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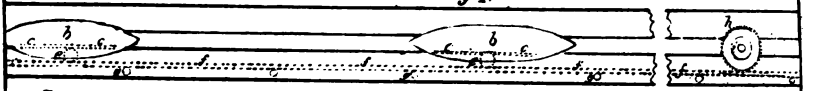
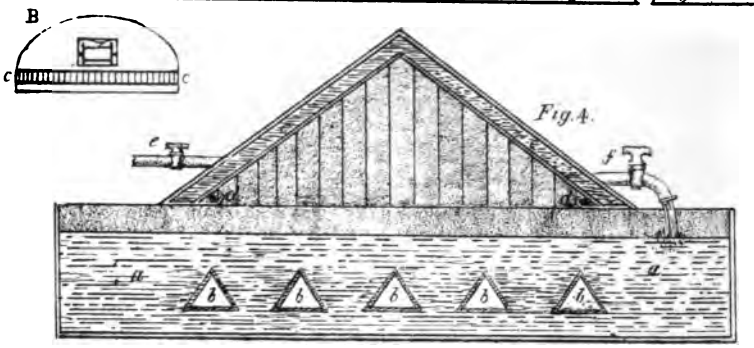
L. Hebert
1 Sep.r 1831

Fig. 1.





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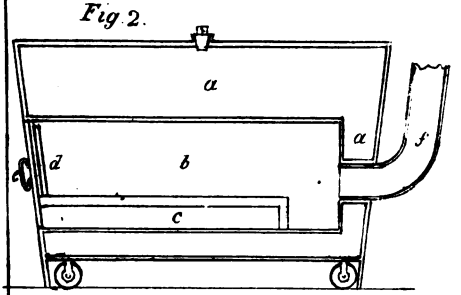

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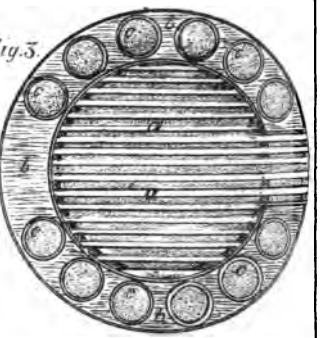

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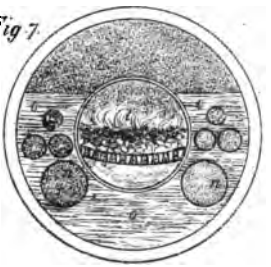

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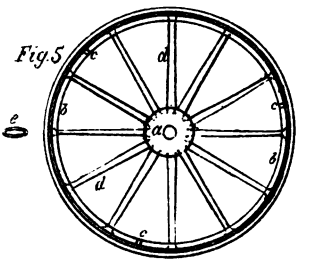

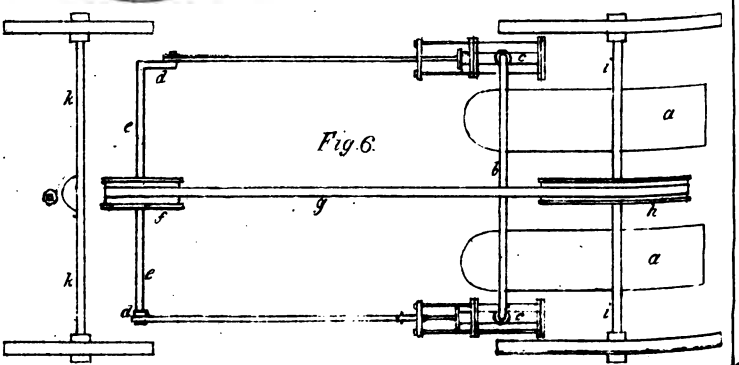

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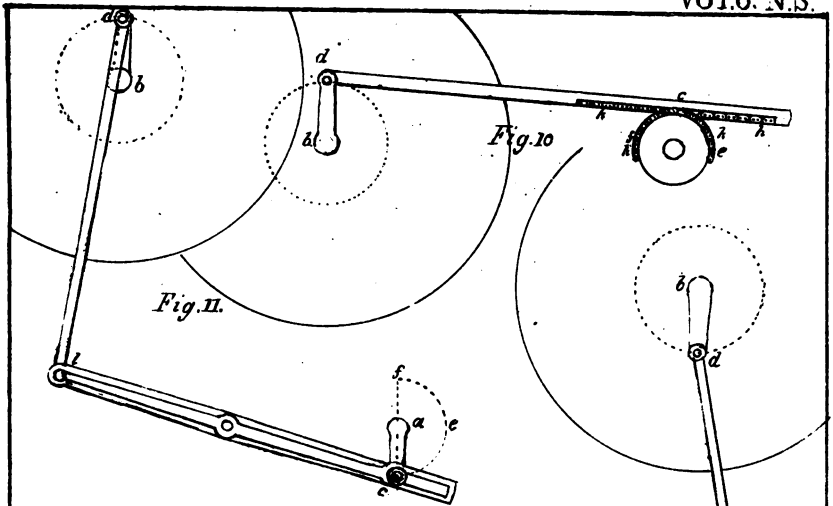

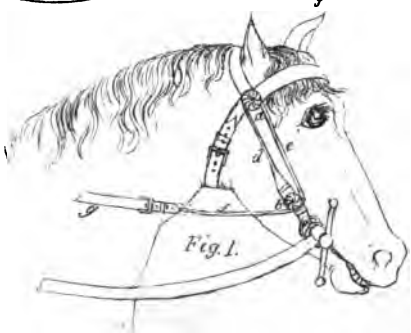

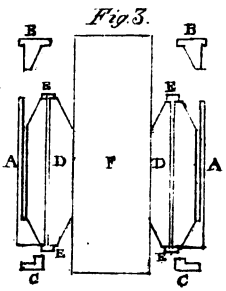

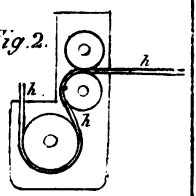

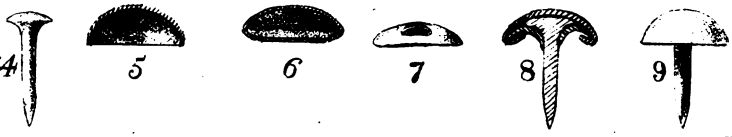

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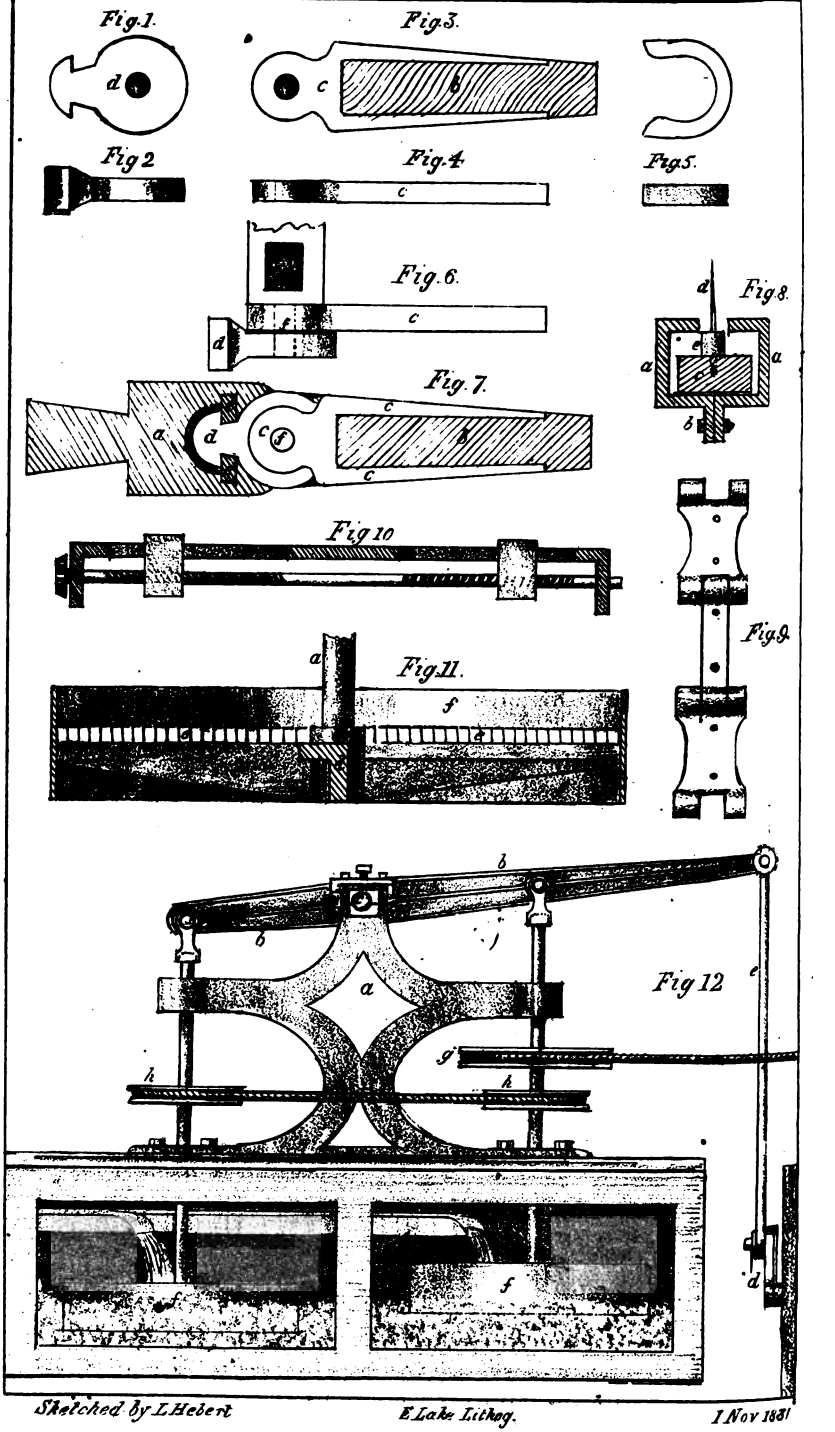

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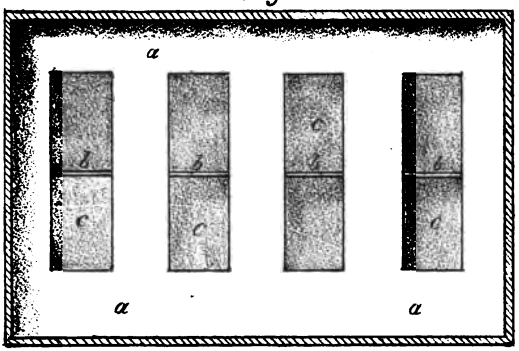

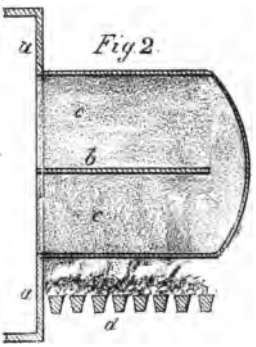

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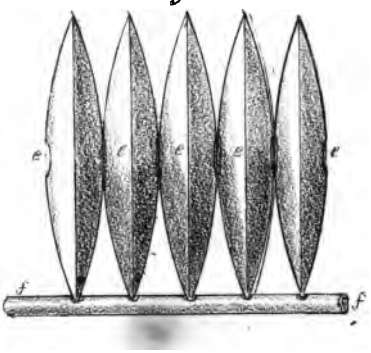

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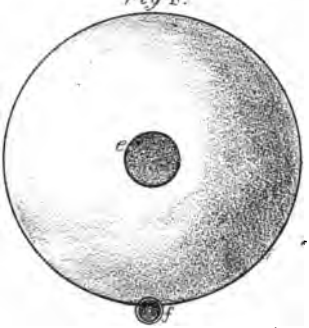

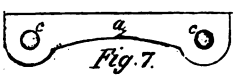

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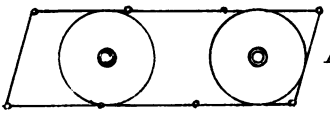

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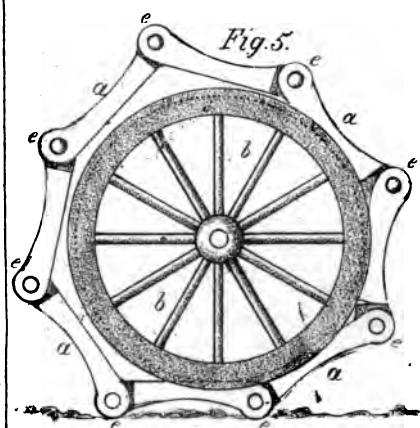

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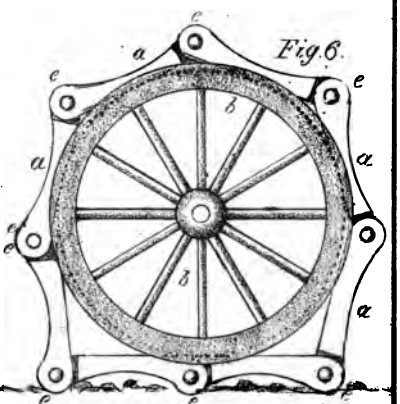

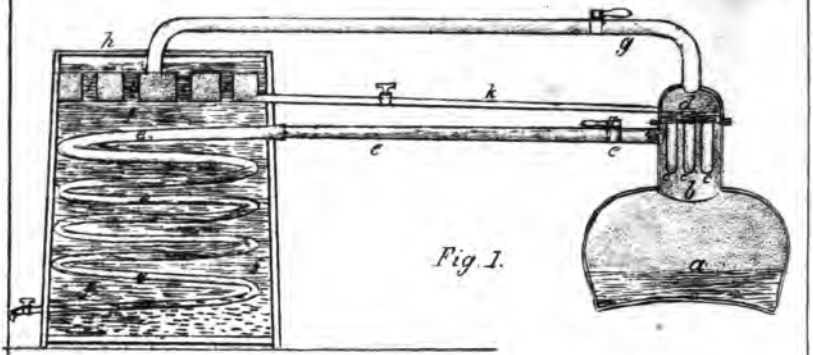

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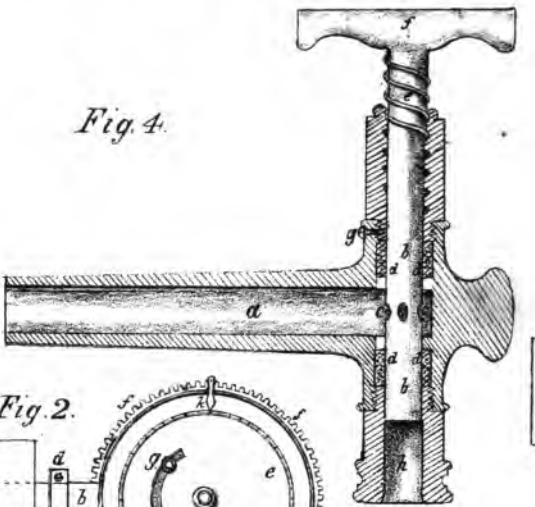

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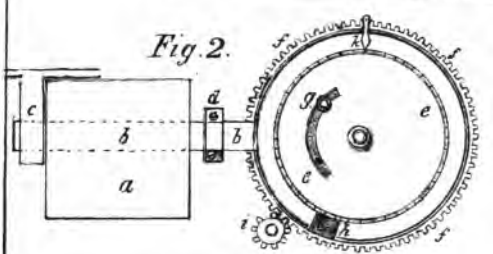

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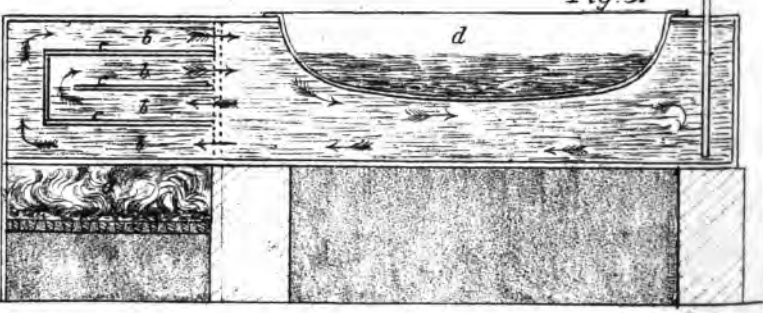

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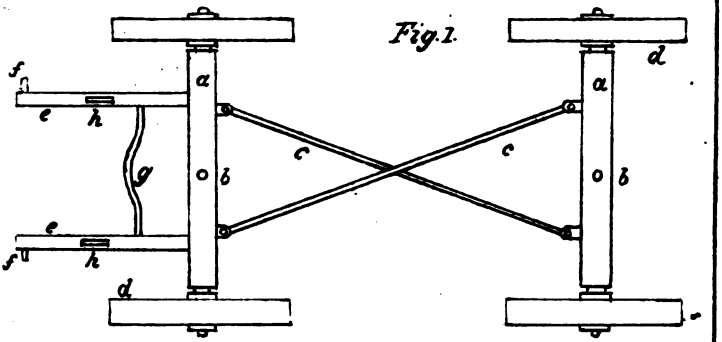

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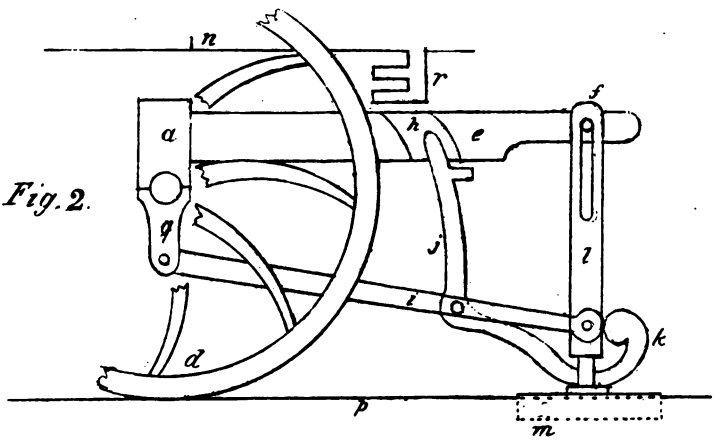

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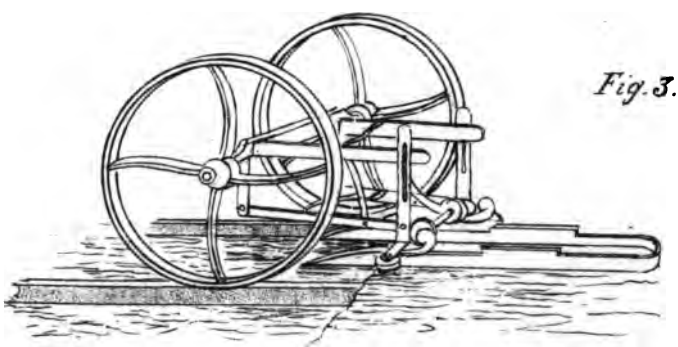

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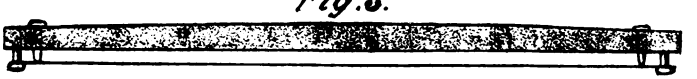

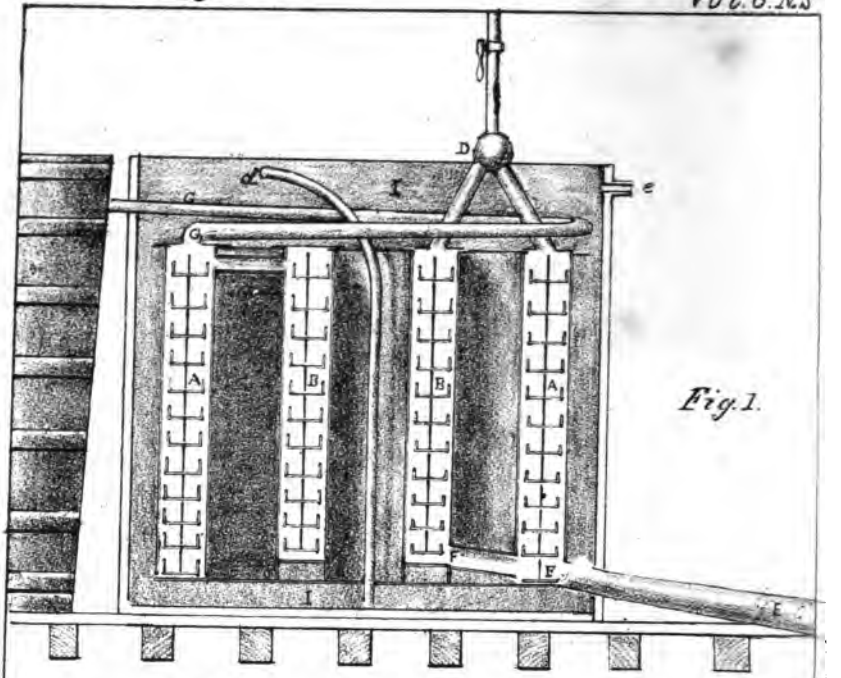

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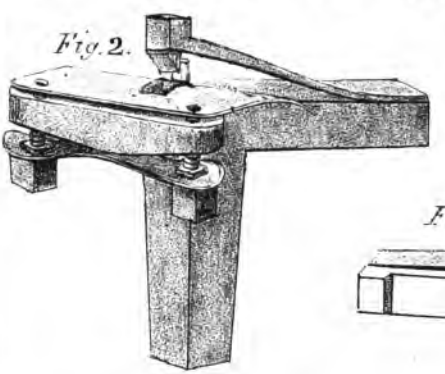

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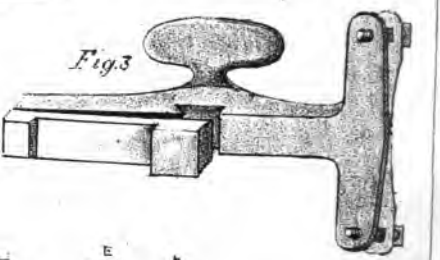

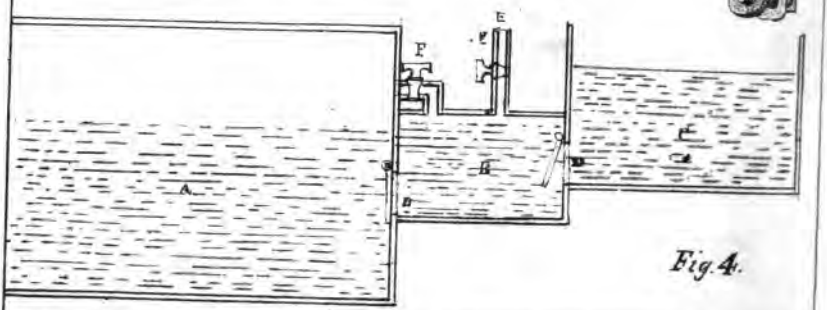

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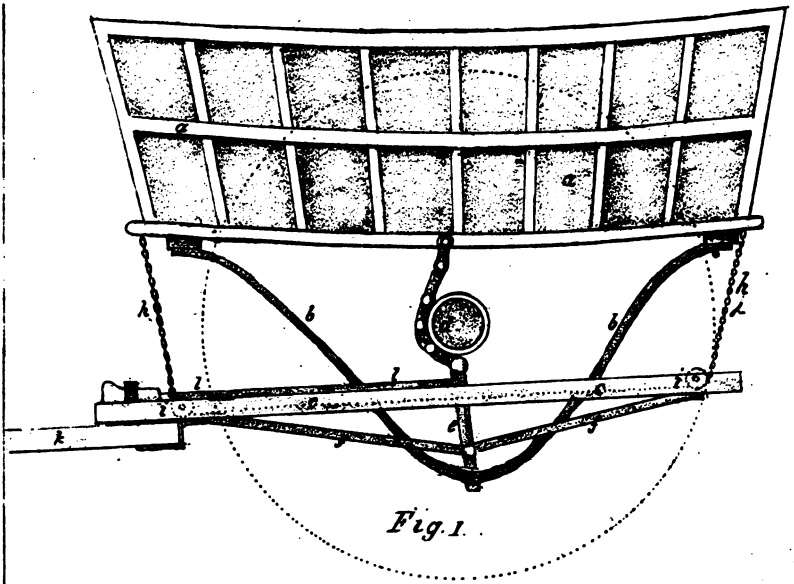

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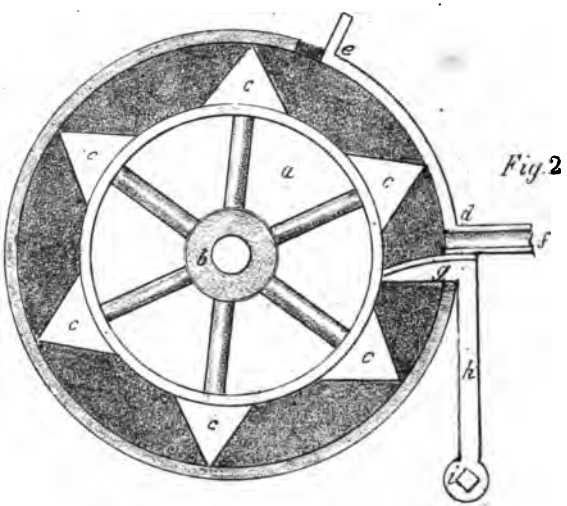

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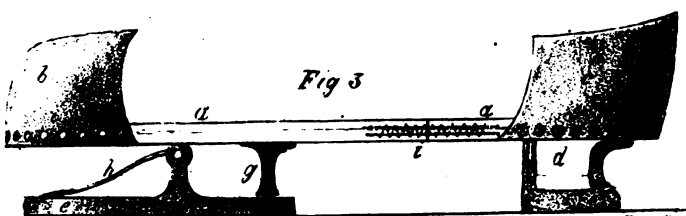

Fig 3